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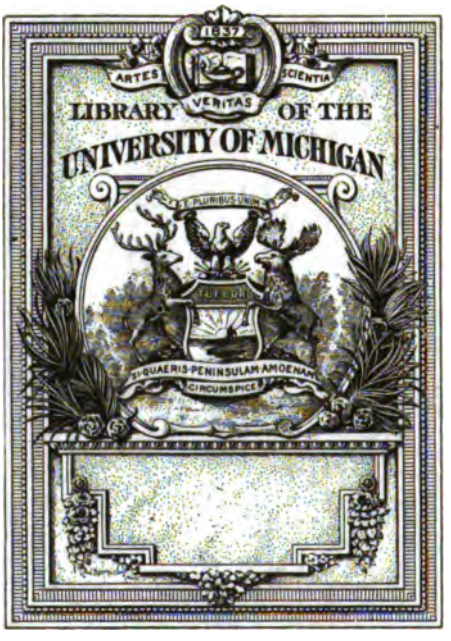
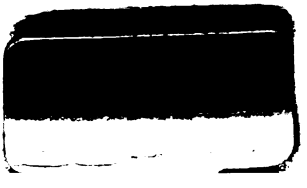


THE GIFT OF
Minn. Hort. society



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Jonathan T. Grimes.

MINNEAPOLIS, MINN.,
President of this Society two years, viz: 1879 and 1880. (See biography.)

ANNUAL REPORT

OF THE

Minnesota State Horticultural Society

1895.

EMBRACING THE
TRANSACTIONS OF THE SOCIETY FROM JANUARY 8, 1895, TO DECEMBER 3, 1895, INCLUDING THE ELEVEN NUMBERS OF "THE MINNESOTA HORTICULTURIST" FOR 1895.

EDITED BY THE SECRETARY,
A. W. LATHAM,
OFFICE AND LIBRARY, 207 KASOTA BLOCK,
MINNEAPOLIS, MINN.

VOL. XXIII.

MINNEAPOLIS:
HARRISON & SMITH, STATE PRINTERS
1895.

LETTER OF TRANSMITTAL TO THE GOVERNOR.

OFFICE OF THE SECRETARY OF THE
MINNESOTA STATE HORTICULTURAL SOCIETY.

207 KASOTA BLOCK, MINNEAPOLIS, MINN., DEC. 3, 1895.

To the Hon. D. M. Clough, Governor of Minnesota:

SIR:—In compliance with the requirements of the law, I have the honor to submit herewith the report of our society from January 8, 1895, to December 3, 1895.

Respectfully yours,

A. W. LATHAM,

Secretary.

THE MINNESOTA HORTICULTURIST.

VOL. 23 FEBRUARY, 1895. NO. 1.

GREETING.

Dear Friends and Fellow Members:

Before going on with the publication of our magazine this year it was found necessary to secure a change in the law in regard to the printing of our reports.

The new law, a copy of which is to be found on page 9 of this number, was enacted without opposition by the legislature, but it has necessarily required some time. The delinquent magazines will now come to you rapidly.

Hereafter "The Minnesota Horticulturist" is to be considered an *established* feature of the work of the society. With the increase of size permitted under the new law it will be possible to cull more liberally from other sources of horticultural information and in other ways add to its general value.

In publishing this magazine we urge your hearty co-operation. Especially as a means of communication, back and forth, with the membership of the society should it be of value to you; through the question box, by question and answer, or by communications, it is very desirable that you should use its columns. There should be in its use an exhibition of the fraternal feeling which we know exists in so large a degree in our association.

Asking your usual charity and consideration in the efforts making for success in the work of our organization, I remain

Yours fraternally,

A. W. LATHAM, Sec'y.

Minneapolis, Minn., April 20, 1895.

170076

OFFICERS OF THE MINNESOTA STATE HORTICULTURAL SOCIETY FOR 1895.

(Any of the officers will willingly answer inquiries in regard to the work of the Society.)

PRESIDENT.

J. M. UNDERWOOD.....Lake City

VICE PRESIDENTS.

E. H. S. DARTT, First Congressional District.....Owatonna
S. D. RICHARDSON, Second " " .....Winnebago City
MRS. A. A. KENNEDY, Third " " .....Hutchinson
R. S. MACKINTOSH, Fourth " " .....Langdon
COL. J. H. STEVENS, Fifth " " .....Minneapolis
J. O. BARRETT, Sixth " " .....Brown's Valley
MRS. JENNIE STAGER, Seventh " " .....Sauk Rapids

SECRETARY.

A. W. LATHAM, Office and Library,
207 Kasota Block, Minneapolis, Minn.
(Office hours of the Secretary from 9 to 12 A. M. on Tuesday, Thursday and Saturday.)

TREASURER.

DITUS DAY - - - - - - - Farmington

EXECUTIVE COMMITTEE.

(President and Secretary are members ex-officio.)

WYMAN ELLIOT, (Chairman) 3 years - - - Minneapolis
J. S. HARRIS, 3 years - - - - - - La Crescent
PROF. S. B. GREEN, 2 years - - - St. Anthony Park
CLARENCE WEDGE, 2 years - - - - - Albert Lea
J. P. ANDREWS, 1 year - - - - - - Faribault
L. R. MOYER, 1 year - - - - - - Montevideo

LIBRARIAN.

A. W. LATHAM, - - - - - - Minneapolis
E. A. CUZNER, (Assistant), Essex and 27th Ave. S. E., Minneapolis

SUPERINTENDENTS OF EXPERIMENT STATIONS.

1895.

PROF. S. B. GREEN (Central Station, State Farm School), St. Anthony Park
E. H. S. DARTT, - - - - - - - - Owatonna
F. H. FIEDLER, - - - - - - - - Fergus Falls
DEWAIN COOK, - - - - - - - - - Windom
CLARENCE WEDGE, - - - - - - - Albert Lea
CHAS. W. SAMPSON (grapes), - - - - Eureka
O. M. LORD (plums and small fruits), - - - Minnesota City
C. W. H. HEIDEMAN (plums and small fruits), - - New Ulm
H. M. LYMAN (apples), - - - - - - Excelsior
J. S. HARRIS, - - - - - - - - La Crescent
L. R. MOYER, - - - - - - - Montevideo
MRS. JENNIE STAGER, - - - - - - Sauk Rapids
W. L. CASE, - - - - - - - - Duluth

COMMITTEES FOR 1895.

FRUIT LIST.

CLARENCE WEDGE, - - - - - - - Albert Lea
PROF. S. B. GREEN, - - - - - - St. Anthony Park
S. D. RICHARDSON, - - - - - - Winnebago City

SEEDLING FRUITS.

J. S. Harris, - - - - - - - - La Crescent

APPLES.

R. H. Buttermore, - - - - - - - Lake City
Chas. Luedloff, - - - - - - - - Carver
D. K. Michenor, - - - - - - - - Etna
J. P. Andrews, - - - - - - - - Faribault

PLUMS AND CHERRIES.

Dewain Cook, - - - - - - - - Windom
G. J. Gjemse, - - - - - - - - Hader
C. W. H. Heideman, - - - - - - - New Ulm

GRAPES.

E. J. Cutts, - - - - - - - Howard Lake
Wm. Morris, - - - - - - - - Excelsior
R. C. Carroll, - - - - - St. Anthony Park

SMALL FRUITS.

John Eklof, - - - - - - - - Cokato
A. H. Brackett, - - - - - - - Long Lake
W. J. Hopkins, - - - - - - Bloomington
M. Cutler, - - - - - - - - Princeton
E. E. Harris, - - - - - - - - La Crescent

FRUIT BLOSSOMS.

R. S. Mackintosh, - - - - - St. Anthony Park
L. R. Moyer, - - - - - - - Montevideo
C. W. H. Heideman, - - - - - - New Ulm

FORESTRY.

J. O. Barrett, - - - - - - Browns Valley
Prof. T. A. Williams, - - - - - Brookings, S. D
D. R. McGinnis, - - - - - - St. Paul

DECIDUOUS TREES AND SHRUBS.

Wm. Somerville, - - - - - - - Viola
J. Cole Doughty, - - - - - - Lake City
O. K. Opjorden, - - - - - - - Milan

EVERGREENS.

H. B. Ayres, - - - - - - - Carlton
Rev. O. A. Th. Solem, - - - - - - Halstad
A. Norby, - - - - - - - Madison, S. D

OUT-DOOR HERBACEOUS PLANTS.

Mrs. Anna B. Underwood, - - - - - Lake City
Wm. Wachlin, - - - - - - - Faribault

HOUSE AND GREENHOUSE PLANTS.

Aug. S. Swanson, - - - Endicott Arcade, St. Paul
Archie Wheeler, - - - - - St. Anthony Park

NOMENCLATURE AND CATALOGUE.

J. S. Harris, - - - - - - - La Crescent
Prof. S. B. Green, - - - - - St. Anthony Park

VEGETABLES.

D. T. Wheaton, - - - - - - - Morris
L. H. Scofield, - - - - - - - Bloomington
T. G. Gearty, - - - - - - Robbinsdale
G. H. Prescott, - - - - - - Albert Lea

IRRIGATION.

Prof. S. B. Green, - - - - - St. Anthony Park
D. R. McGinnis, - - - - - - - St. Paul
A. H. Brackett, - - - - - - - Minneapolis

APICULTURE.

John Turnbull, - - - - - La Crescent
Wm. Danforth, - - - - - - - Red Wing

ORNITHOLOGY.

Wm. T. Shaw, - - - - - St. Anthony Park
F. I. Harris, - - - - - - - La Crescent

ENTOMOLOGY.

Mrs. A. A. Kennedy, - - - - - Hutchinson
J. S. Harris, - - - - - - - La Crescent

COOKING AND PANTRY STORES.

Mrs. Harry Snyder, - - - - - St. Anthony Park
Mrs. E. Cross, - - - - - - - Sauk Rapids
Mrs. H. R. Reeve, - - - - - - - Lake City

PUBLICATION.

Wyman Elliot, - - - - - - Minneapolis
Prof. S. B. Green, - - - - - St. Anthony Park
A. W. Latham, - - - - - - Minneapolis

LEGISLATION.

Wyman Elliot, - - - - - - Minneapolis
J. M. Underwood, - - - - - - Lake City
D. R. McGinnis, - - - - - - St. Paul
J. S. Harris, - - - - - - - La Crescent
F. G. Gould, - - - - - - - Excelsior
Prof. W. M. Hays, - - - - - St. Anthony Park
A. W. Latham, - - - - - - Minneapolis

CONSTITUTION OF THE MINNESOTA STATE HORTICULTURAL SOCIETY.

ADOPTED JAN. 9, 1895.

Article I.—Name.—This society shall be known as the Minnesota State Horticultural Society.

Article II.—Its object.—The object of this society shall be the advancement of the art and science of horticulture throughout the state.

Article III.—Membership.—Any person may become an annual member by paying to the secretary an annual fee of $1.00, or a life member by the payment of $10.00, provided that the life fee may be paid in two annual payments of $5.00 each. The members of any local society may become annual members of this society provided such local society shall send to the secretary of this society a properly certified list of its members, an annual report of its proceedings and an annual fee of seventy-five cents for each member of such local society where the membership numbers from ten to twenty-five, or fifty cents for each member where the membership is more than twenty-five.

All memberships shall expire at the close of the first day of the next annual meeting. Honorary members for a time stated, or for life, may be elected at any annual meeting by a two-thirds vote of the members present, provided that the name proposed for this purpose shall be first referred to the executive board. Every member shall be entitled to one copy of the transactions, postpaid, as often as published.

Article IV.—Officers.—Its officers shall consist of a president, one vice-president from each congressional district, a secretary, a treasurer, a librarian, and an executive board of six. All officers shall be elected separately and by ballot cast personally by the membership, and shall hold office until their successors are elected and qualified, except that the vice-presidents may be elected by the secretary casting therefor the ballot of the society. The annual election of officers shall take place on the afternoon of the the third day of the annual meeting. All terms of office shall begin immediately upon election, and no person shall be eligible to hold office who has not been a member of the society for the three years immediately preceding. The president, vice-presidents, and the treasurer shall hold their office for one year. An executive board to consist of six members shall be elected at the first election after the adoption of this constitution. The first two members elected shall hold their office for a term of three years, the next two members shall hold their office for a term of two years, and the last two shall hold their

office for a term of one year, and at each annual election thereafter two members of this board shall be elected to serve for a term of three years. The president and secretary of this society shall be ex-officio members of the executive board. The secretary shall be elected by the executive board at its first session after the close of the annual meeting, and hold his office for one year.

Article V.—The President.—The president shall call and preside at all meetings of the society and, under the direction of the executive board, have a general superintendence of its affairs. In the absence or disability of the president, the executive board shall select one of the vice-presidents to act as president pro tempore.

Article VI.—The Vice-Presidents.—The vice-presidents shall have the general supervision of all horticultural interests in their respective districts, and as such constitute a general fruit committee, and make a report to the society at its annual winter meeting and recommend a list of fruits succeeding best in their districts. In consideration therefor the society shall pay the traveling expenses incurred in their attendance at said meeting.

Article VII.—The Secretary.—The secretary shall keep a full record of the proceedings of the society and of the executive board. He shall receive and pay over all moneys collected from members or otherwise, to the treasurer, taking his receipt therefor. He shall, under the direction of the executive board, conduct the correspondence of the society, have charge of its books and papers, prepare its reports for publication and attend to their distribution. He shall be ex-officio librarian of the society. He shall receive for the necessary expenses of reporting the meetings, postage, stationery, printing, office rent, assistance, salary, etc., such sums as the executive board may vote therefor. He shall make a report of the work of his office at each annual meeting.

Aritcle VIII.—The Treasurer.—The treasurer shall receive and hold all funds of the society, and pay out the same only upon the order of the president, countersigned by the secretary. He shall give such bond as the executive board may direct, to be approved by the president and filed with the secretary. He shall make a report of all receipts and disbursements of his office at the annual meeting, and at any other time when called upon to do so by the executive board.

Article IX.—The Librarian.—The librarian shall have charge of the library and report its condition at the annual meeting.

Article X.—The Executive Board.—The executive board shall, at their first meeting after the annual election, elect one of their members chairman, who shall call and preside at all meetings of the board and, as such officer, endorse all bills audited by the board. They shall have general charge of the affairs of the society, and make a report in detail at each annual winter meeting. They may call a meeting of the society at any time they deem advisable, giving at least fifteen days notice through the monthly publication of the society or by mail service on the members. It shall be their duty to audit all bills before they shall be ordered paid by the president and secretary. They shall prepare a program for each regular

meeting of the society, to be issued at least two weeks before the date of such meeting. They shall appoint annual committees on fruit list, seedlings, nomenclature, small fruits, apples, vegetables, flowers and such other subjects as they deem best. They shall fill all vacancies occurring in the offices of the society by appointment, to hold good until the next annual election. They shall have full care and disposal of all funds in the treasury of the society, and shall expend the same in such a manner as in their judgment shall best promote the interests of horticulture in the state. They shall serve without compensation, but be entitled to their expenses in attendance at the meetings of the board or society.

A meeting of the executive board may be called by the chairman at any time he sees fit or upon the written request of any two members of said board, due notice being given either in person or through the mail to each member thereof. A majority of the board shall constitute a quorum for the transaction of business.

Article XI.—Meetings.—The society shall hold two regular meetings, annually, one commencing on the first Tuesday in December, to be called the annual meeting, and the other in summer at such time and place as the executive board may direct.

Article XII.—Quorum.—Ten members shall constitute a quorum at any meeting of the society.

Article XIII.—Amendments.—Amendments to the constitution or by-laws may be enacted by a vote of two-thirds of the members present and voting at any annual meeting, on two days' notice of said amendment being given in writing.

AN ACT PERTAINING TO THE MINNESOTA STATE HORTICULTURAL SOCIETY.

PASSED APRIL 2, 1895.

Be it enacted by the Legislature of the State of Minnesota.

SECTION 1. There shall be annually printed and bound three thousand copies of the report of the Minnesota State Horticultural Society, provided the number of printed pages of the same shall not exceed six hundred. One thousand copies of the same, more or less, as requested by the executive board of said society, shall be printed in monthly installments and bound in paper as a monthly report, to be distributed among the members of said society. The remainder shall be bound at the close of the year, three hundred in paper and the balance in cloth, and shall be distributed by the society as follows: One copy to each of the state officers, members of the legislature, clerks and judges of the supreme court, and members of the board of regents and faculty of the State University; ten copies to the State Historical Society, fifty copies to the State Agricultural Society, one to each public library in the state, and the remaining copies as the Minnesota State Horticultural Society shall deem best.

SECTION 2. Section two, chapter seven, of the General Laws of 1874, is hereby amended by inserting after the words, "the printing and binding of all reports," the words, "(except the report of the Minnesota State Horticultural Society)"; and further by annexing to the close of the said section the words, "The report of the Minnesota State Horticultural Society shall be printed by special contract, with the approval of the president of said society, provided the price paid be not in excess of that paid under the contract for the third class."

SECTION 3. All acts or parts of acts inconsistent with the provisions of this act are hereby repealed.

SECTION 4. This act to take effect and be in force on and after its passage.

FRUIT LIST.

Adopted by the Minnesota State Horticultural Society, Jan. 11, 1895.

APPLES.

Of the first degree of hardiness for planting in Minnesota: Duchess, Hibernal (Lieby).

Of the second degree of hardiness: Charlamof, Wealthy, Longfield, Tetofsky.

Promising varieties for trial: Kaump, Anisim, Okabena, Peerless, Repka Malenka, Hotchkiss, Borovinka, Gilbert.

Best crabs and hybrids for cultivation: Virginia, Martha, Whitney, Early Strawberry, Briar Sweet, Minnesota, Sweet Russet, Gideon's No. 6.

Promising varieties for trial: Tonka, Dartt, Greenwood, Faribault, Pride of Minneapolis, Crampton No. 3.

PLUMS.

Best for general cultivation: Desota, Forest Garden, Weaver, Cheney, Wolf.

Most promising varieties for trial: Rockford, Rollingstone, Wyant, Ocheeda.

GRAPES.

Best for general cultivation: Concord, Delaware, Moore's Early, Worden, Agawam, Janesville, Brighton.

RASPBERRIES.

Best for general cultivation: Red varieties—Marlborough, Turner, Cuthbert, Brandywine. Black and purple varieties—Ohio, Palmer, Nemaha, Gregg, Schaffer, Older.

BLACKBERRIES.

Best for general cultivation: Ancient Briton, Snyder, Stone's Hardy.

CURRANTS.

Best for general cultivation: Red Dutch, White Grape, Victoria, Stewart, Long Bunch Holland, North Star.

GOOSEBERRIES.

Best for general cultivation: Houghton, Downing.

STRAWBERRIES.

Best for general cultivation: Pistillate—Crescent, Warfield, Haverland. Staminate—Bederwood, Capt. Jack, Crawford, Wilson.

Valuable native fruits for trial: Dwarf Juneberry, Sand Cherry.

Annual Meeting.

HELD AT LAKE CITY, JAN. 11, 1895.

The late annual meeting was in many respects one of the most interesting and successful, if not the most so, of the twenty-eight annual gatherings of the Minnesota State Horticultural Society. It was held under unusually favorable auspices, the weather even assisting in its mildness as scarcely ever before on such an occasion.

The meeting was held in the halls of the local masonic association, and if ever our people are so fortunate as to have a home of our own, we can scarcely do better than copy after the plans of this hall with its convenient assembly room, committee rooms, banqueting hall, etc. Everything considered, it was, we believe, the most convenient and pleasant quarters in which we have ever met. Then the good citizens of Lake City took it very much to heart and in every possible way aided in entertaining and caring for the visitors, so that the universal expression was, "I have been sent to the best place in Lake City." Judging by the number of times this remark came to the ears of the writer, all the homes of Lake City must be of this character.

In point of numbers in attendance this meeting stands easily on a par with any of its predessors, the hall, seating in the neighborhood of 200, being always well filled and often overflowing. Of the membership some over 100 were in attendance, the balance being interested Lake City people.

The very full program was carried out in its entirety and with much regularity, although in the press of business once or twice it got in arrears and necessarily much interesting discussion was cut off. The papers and discussions on fruits, mainly apples, occupied largely the first and second days. An increased interest was added to this discussion by the presence of President Kellogg and Secretary Phillips of the Wisconsin society, and several other well known fruit growers from Iowa and Wisconsin.

On Tuesday afternoon a new constitution was presented and read and, as provided, was laid over for action till afternoon of the next day. On Wednesday afternoon this came up in its order and was discussed and adopted, one section at a time, and finally adopted as a whole almost without dissent. It provides for placing the management of the society in the hands of an executive board consisting of six members, two to be elected annually, thus ensuring great permanance in carrying forward any settled policy in the administration of the society affairs. In making this change our society has copied after older associations which, though greater in years, are not so in strength of association or in the amount of work being done. The change will, we believe, be found to be a wise one.

Thursday forenoon was devoted to irrigation and proved a very interesting session, emphasizing the growing belief that the horticulturists of our state must in self protection make preparations for an artificial application of water to the garden.

On Thursday afternoon the subject of vegetable culture was considered, and many interesting papers were read and discussed. The election of officers took place at this session, not, however, consuming much time, as the officers were nearly all re-elected with little or, in most cases, no opposition. Judging by the practical unanimity displayed in the business deliberations of the society and in the annual election the association stands together as ever practically a single unit to use its concentrated strength, as heretofore, to press its noble and ennobling work. Forestry was the topic for Thursday evening and several practical papers were presented.

The meeting closed with a banquet on Friday afternoon. This is becoming a feature of our annual sessions and so very pleasant a one that we desire it to be permanently established. On this occasion tables had been laid, filling the two adjacent halls, seating nearly 200. They were beautifully decorated with flowers and greens and laden with the choicest of viands to tempt the hungry horticulturist. The Lake City orchestra lent the charms of music to add to the festivities of the hour. Following the banquet were three hours of a flow of reason which was enjoyed to the utmost. Wit and wisdom, prose and poetry, fact and fancy, music and song, all lent their charms to grace and brighten the occasion, and when it all closed with a bright banqueting song from our jovial president we all felt that this auspicious event had been rounded out in full. Nothing more was needed or could be asked to complete our satisfaction. This occasion is ever to be remembered, and to say that our people appreciated in full the great kindness and courtesy of Lake City's citizens seems almost needless.

The papers and discussions belonging to this meeting will appear in full with other matter in the forthcoming numbers of "The Minnesota Horticulturist" for 1895.

A. W. LATHAM, *Secretary.*

Officers' Reports

OF THE

Twenty-eighth Annual Meeting of the State Horticultural Society.

PRESIDENT'S ANNUAL ADDRESS.

J. M. UNDERWOOD, LAKE CITY.

Ladies and Gentlemen of the Minn. State Horticultural Society:

It is with great satisfaction that I appear before you this evening on the twenty-eighth annual meeting of our society.

We have had the pleasure of entertaining you in Lake City at one of our summer meetings, when the beauties of flowers and fruits enhanced the occasion, but the time was too short for you to come into intimate relation with our homes and to know us at our best. Now, while the winter is not so propitious a time to become acquainted with our romantic location on the shores of this beautiful lake, and the horticultural interests of our city and the surrounding country are not so inviting as they would be in the summer, we hope that our firesides will compensate by their warmth for any lack on the part of nature.

During the year 1894, it is probable that the horticulturist had heaped upon him every experience of an objectionable nature that he had heretofore escaped or would ever be called upon to pass through. This experience was by no means confined to Minnesota; but frosts, storms, drought, bugs, worms and blight seemed to hold high carnival without regard to location. Notwithstanding, fruit has been plenty and some of it cheap. With grapes at sixteen cents for an eight pound basket, surely every one should have had all they could eat; and yet there were millions of our inhabitants who probably did not eat a bunch of grapes last year.

At our last annual meeting we touched upon the importance of adopting irrigation in the growing of fruits and vegetables. The drought of last summer emphasized still more the advisability of the intelligent application of this resource. Its discussion is made a feature of our program, and I hope much valuable information may be brought out regarding it. There is no provision in the statutes of our state for acquiring "water rights" for irrigation purposes, but an act of the legislature should be passed during this winter's session to cover this case.

Another question of importance to our horticultural interests is the improvement of our roads—in fact, there is not a business interest but what demands better roads in the country. Our merchants have their stores full of winter goods that must be sold; the holidays come and the farmers want to go to town to do their trading, but the roads are so rough that only a few, those living near by, will venture out. And this condition prevails all over the state. Suppose there were five good, well kept, macadamized roads, each running ten miles back from Lake City, you could not find a hall in town large enough to hold the farmers who would be in attendance upon our meetings; and in the summer time the produce of the farm and garden could be brought to town in good condition and at a saving of time and expense. Our cities are greatly in advance of the country in their facilities for transportation. The electric cars flit with the rapidity of lightning from place to place, and in some places a person can ride thirty miles for five cents; while in other places, without these facilities, it costs twenty-five cents to ride half a mile. It is time our rural friends awoke from their slumbers and secured legislation that would enable them to levy a tax on land for the improvement of roads in proportion to its proximity to the improvement, and to provide for its judicious expenditure by competent supervisors. With a good road to drive on, a man could have a fruit farm five miles from town and get his fruit to market quickly and in good condition.

The past year witnessed the holding of state and local fairs once more. They seemed a little tame with the memory of the great World's Fair still lingering in our minds.

It is a great satisfaction to those who have followed the success of our State Agricultural School to witness the splendid results accomplished. Here our young men fit themselves, during a three years' course, to be fully competent to conduct a farm, a dairy or a fruit farm; while we, who did not have their advantages, have required thirty years of experience to reach the same results. Farmers, have you a son whom you can send to this school? Do not delay a single day. Send him at once. He will come back to you with knowledge of the best and most advanced ways to conduct a farm. Do you think you know it all now? You are mistaken. Have you never got your load into the rut and mud of unimproved roads, when it took some strong adjectives and an extra team to pull you out? Then did you not go at it and fix that road? Well, we all get into ruts, and here is a chance to get out and repair our methods by sending our boys to our State School at St. Anthony Park, and they will come back to us and help us out. The school is ours free, the expenses for living are light; and I hope the time is not far off when provision will be made for our daughters so they, too, can share the privileges, and come home and help mother by introducing the best methods of housekeeping.

I desire to call the attention of our society to the needed change in our constitution and by-laws. Our work has become of so great importance that our organization should be on a permanent basis and, instead of electing a new set of officers each year, we should

elect a board of trustees to serve for one, two and three years, so that in retiring them, they would not all go out of office at once. Another wise provision would be to set aside one-half of our receipts for membership as a permanent fund which should be allowed to accumulate until some fitting time came for furnishing a home for our society. We lack the means to do this, and I do not know of a better way to make a start.

It has proved a great success and of inestimable value to have the proceedings of our society published in magazine form. It brings our lessons to us in a sensible manner, and just enough of them at a time to be a delightful relish. I congratulate the society in making the change and in having so efficient and successful a secretary as Mr. Latham to conduct it. Our magazine was a venture, it is true, but "nothing ventured, nothing gained." We were the first of the state societies to adopt the plan, and it certainly is one I can heartily recommend to all, provided they have a man fitted by experience and education to conduct it. A splendid field of usefulness lies before us with this medium at our hands. All who wish to cannot be present at our meetings, and, in this way, we can go to them once a month and carry them greeting and words of cheer.

Our summer meeting was a most delightful one, held on the beautiful grounds of Mr. and Mrs. Dorillus Morrison, of Minneapolis. The day was an ideal one in June, warm enough to be pleasant and under the grateful shade of the magnificent trees that graced the lawn, it was cool and inviting. A fine exhibit of roses and strawberries was spread on the tables, and an ample provision of good things to eat. A relish of toasts was served which proved to be a very fine literary program, and, although well reported in our "Minnesota Horticulturist," should have been heard to be fully appreciated. All who were present enjoyed the occasion exceedingly and carried to their homes grateful rememberances of the hospitality of Mr. and Mrs. Morrison. I am sure if our members knew what good times we have at our summer meetings, they would break away from business one day and attend.

The past year has been fraught with much of interest to horticulture. The intense feverish condition of the industrial and financial interests of our land, that have tried to seek a solution in frenzied political vibrations from one party to another, will, after all, find a more satifactory adjustment of the unfortunate conditions that exist by adopting a sound, sensible mode of horticultural living for all classes, and, particularly, the restless unemployed. During the year men have pranced in wild enthusiasm across the continent to Washington, led by hare-brained enthusiasts, regardless of the rights of others and in defiance of the law. Railroad trains were stolen and compelled to transport them on their way. Towns were besieged and required to furnish food and shelter, and in some instances large sums of money were contributed to furnish means for removing the incubus that taxed the people to their wit's end to know how to get rid of. An army of tramps! Now tramping wearily along; again, riding in wagons or anything they could command; or floating down the Father of Waters on rudely constructed rafts, like so

many rats. Wearily they dragged themselves in rags and dirt to the nation's capitol, vainly seeking relief from their fancied condition of wrong and inequality.

Do you suppose that if those men had ever known the pleasure of eating a strawberry shortcake, the fruit of which they had grown on their own vines, they would ever have been found in such a humiliating condition as we viewed them.

Again the alarm is turned in. Electric wires vibrate with fearful rapidity. Click! Click! Click! Click! The operators listen and write. A strike is on! The daily papers are ablaze with its details! A great railroad corporation is tied up and every wheel is stopped! Bridges are burned! Business is suspended! Great industries are sacrificed and towns are left to starve! I don't suppose one of those strikers ever knew the comforts of home with a nice fruit garden. That is not the way they seek comfort. Arbitration is enlisted and again the wheels revolve and business for a time revives. But hark! Again with overwhelming crash another strike comes on. But this time with better formed plans and more disastrous effect. Property is destroyed, cars are overturned and burned, men, women and children are victims of the deadly bullet, for the army has to be called out. Even local authorities are powerless. State sovereignty trembles, hesitates, and the national government declares martial law What a spectacle in this free, broad, generous land of ours, where every man can easily have his own home and live under his own vine and fig tree, with no call whatever for injuring the property of others.

Is the country bettered by this upheaval of its business interests? Are the conditions changed in the least? It is true the Coxey army is disbanded, the strikes are put down, silver is demonitized, the tariff bill passed and election is over; but is any one a bit better off than he was a year ago? Are not the conditions for unrest and dissatisfaction just as great? If so, what can we, as horticulturists, do to improve the situation? We can do this: We can carry forward the work of disseminating knowledge regarding our calling, and in many ways we can turn men's attention to our independent, healthful and pleasant life, surrounded by fruits and flowers, our tables laden with fresh vegetables, sweet milk and cream, and with honey from our busy bees; and we can show them that when four dollars a day is not enough to bring them happiness, they had better seek with us a rural retreat and taste the joys only known to the horticulturist.

How can a man help being restless and dissatisfied working by the day, no matter whether he gets one dollar or five dollars, if he lives in contracted quarters in rented houses, with no garden or anything to interest him when his day's work is done? The first thing he thinks of is to rush off somewhere and in conviviality squander the money he has earned. Suppose, instead of this, when his work was over, the mechanic could go to a home surrounded by trees and flowers with a garden of fresh growing vegetables; or if it were winter time, he could review mentally the lessons and experiences of the year, aided by "The Minnesota Horticulturist" or some

of the many valuable papers that represent the interests of horticulture; then, instead of throwing away his money, he would save and spend it judiciously along lines that would help him and bring him blessings instead of curses. This opportunity lies at the door of almost every man in the land. It is astonishing how much fruit or how many vegetables can be grown on an ordinary city lot with the facilities that are at command. And yet people neglect their opportunities, preferring to live without or live on what they can buy in the market, which is seldom so fresh and nice. It is difficult for men to think they can do more than one thing, and I know failures often discourage them.

But people must be taught better ways. A few years ago, the farmers in this country thought they could not grow anything but wheat. Added facilities cheapened the product, and they seemed panic stricken. They were compelled to grow other things. The Farmers' Institute came along and experienced and skillful teachers taught them how to make diversified farming profitable, and today, no more prosperous, happy, contented and independent people can be found in the world.

Last summer, in talking with one of the ladies living on a farm a few miles from here, I asked: "Do you have fruit at your home?" "Oh! yes," she replied, "we have more than we can use; we sell and give away quantities every year." In a garden in this town, there were raised last summer thirty-three bushels of tomatoes from a piece of ground twenty feet square. A friend of mine grew enough vegetables in his garden, with the help of city water, to pay all the expense of water for his place and interest on the investment. There is knowledge needed to do these things, it is true, and that is the object of our society—to help others to know how to do and how to be successful in those interests which we represent.

When men and women are out of work and suffering for food, their immediate wants can be supplied, and it is very commendable in those who open soup kitchens where they can be fed; but in this way they find only temporary relief from hunger, and a person must surely feel humiliated and his character weakened by frequent leaning upon charities of this kind. Many of the charities in our large cities command our enthusiastic admiration in their intelligent provisions for supplying some of the most necessary things: such as bread, milk, and coal in small quantities at actual cost. And it has been demonstrated as practical and accomplishing great good to conduct a loan agency for furnishing money for temporary assistance at a low rate of interest, on chattel mortgage, and thereby save many a poor man or woman from the necessity, as a last resort, of going to a pawnshop and paying an exhorbitant usury. Assistance of this kind is calculated to relieve distress without taking away one's self-respect and self-reliance and must rank as a higher class of charity than gifts bestowed outright.

There is still another way to help people, and that is by furnishing them work, and I count it an honor for a man or a corporation to invest large sums of money that give employment to others. I know there are some who are never satisfied with the way this or that man

or corporation invest their money. They want to have something to say about it. This class of people are mischief breeders, calamity howlers and unsafe counselors; they are officious meddlers continually crying wolf! wolf! and filling the minds of the people with unrest. The laborer will do well to keep shy of them, and when he is not satisfied with his employer, let him maintain his dignity of character by availing himself of legitimate means of gaining his purpose and by doing as he would be done by. The highest blessing we can bestow upon the laborer is to teach him how he can be independent—himself a capitalist on a small scale. Millions of acres of land are at his disposal, and ten acres is enough to support any man comfortably; only needing intelligent management to infinitely surpass the rag-picking, gutter-scraping employment of the cities, with their free dinners and soup kitchen attachments.

It is winter time and there is nothing to do at home except the chores, and there are many good reliable men who will be glad to do them for their board or the boys can do them out of school hours, while as members of the State Horticultural Society, we come together and discuss all matters of vital interest, get new and better ideas from one another, renew acquaintances and strengthen friendships.

REPORT OF CHAIRMAN OF EXECUTIVE COMMITTEE.

WYMAN ELLIOT, MINNEAPOLIS.

The next day after the adjournment of the last annual meeting the executive committee met at the secretary's office, 427 Nicollet Avenue in the Horticultural library room. Present, the full board, including president and secretary. The purpose of the meeting was the revising of the list of standing committees and arranging the business of the society as far as possible to avoid calling the executive committee together again previous to the time of holding the summer meeting in June. Various new plans were discussed whereby the usefulness of the society might be enlarged and our membership increased. Some of the plans then made have not materialized as successfully as was then anticipated, especially those of organizing county and auxiliary societies; we have had the expense and tried the method advocated, paying pretty roundly for it. Experience you pay for is much the best, when you do not pay too much for it.

If we have not received as great a degree of success as desired, we have secured some free advertising and acquaintance with people that will amply repay for the time and money expended in this direction. I think we can trace the acquiring of several new members to this experimental effort, and we do not give up the hope of yet evolving some plan along this line that will increase our membership and broaden our usefuluess. This idea of organizing progressive horticulturists into energetic clubs and societies scattered all over our state should be fostered and advocated by every member, new and old, of this society. A suggestion has been received from one of our executive committee that members of auxiliary

horticultural societies paying one-half of the annual membership fee to this society should be entitled to receive the monthly paper and a bound copy of the reports, and auxiliary societies, whose members belong to this society should have the right to send three delegates to the annual meeting with privileges equal to those of full paid members. This is similar to the amendment of the constitution offered by Mr. Wilcox in our report of 1889, page 436, which was then adopted. For one, I am willing to extend the franchise of membership to delegates from all horticultural societies in our state, but not to members of said societies unless they give something in return for our monthly and annual reports.

The very energetic methods pursued by our secretary has increased our membership very much; some of this increase comes from the free advertising and much from publishing the monthly paper, but the largest number from our secretary's persistant and untiring efforts in seeking new members.

The Minnesota Horticulturist. While this new fledgeling is by no means perfect, nor has it filled the fullest expectations of the editor, our worthy secretary, it has secured many warm commendations from the press and the people of the Northwestern states. This was an experiment of which there were some doubts of its feasibility at first, but thus far it has been quite successful and meets the wants of the people much better than the issuing of our transactions all in one large volume six or eight months after the annual meeting.

There are some features of practical value that have developed in the printing of our reports in this monthly form that can be utilized to great advantage to our society and its members, with very little additional cost, if we should continue its publication in this present form. Through this monthly contact between the secretary and our members, there springs up a desire for each to help the other in many ways, and it is an easy method of inquiry and answer by which all should profit.

Institute Work. What more can we do as a society to improve the horticultural knowledge than to disseminate throughout the state our institute work? This question should be freely discussed, as suggested by one of our veteran horticulturists. That there is room for very much improvement upon the present methods there can be no doubt; the question is, how shall we go about it and reach the desired results economically? There should be a closer unanimity of purpose existing between the official members of this society and the institute workers. It has been suggested that the institute work should be enlarged by having more workers in the field and thus cover more thoroughly the large area of our state—by having, say, three or four corps, each with its separate workers under the direction of a conductor, and the whole body governed by one superintendent, utilizing local talent whenever the right material is available.

Legislation Needed. Your committee report that a great advantage would be gained to the State Horticultural Society if we could have a larger appropriation from the state, so we could afford to publish our monthly reports with additional current topics of inter-

est to those engaged in horticultural pursuits; or if we could have the present law governing the publishing of our reports so changed that we could have what it costs the state to publish them in money, we could, by using a greater degree of economy, get much more for the amount expended and not increase the taxes of the people one little bit. If our legislators could be induced to see this as those of us who have investigated this subject and make the appropriation direct, it would be much better than it is now.

The law governing or attempting to regulate the sale of nursery stock in our state needs to be revised and some new features introduced whereby it may become constitutional and more effective in the suppression of fraud and afford a degree of relief to our people. As the law is at present, there seems to be no way of seeking redress or recovering damages for fraudulent transactions in this kind of trade. Some special legislation should be had at once that will help protect the interests of the farmers and horticulturists, and it would be well for our society to devote a short time to the discussion of this topic.

Fruit and Flower Cabinets. We need to secure samples of all the finest and most perfect specimens of fruit and vegetables grown or produced in our state. These put up in papier mache and wax casts would be lasting and valuable contributions to our horticultural, historical and university libraries. They could also be further utilized by distributing specimens to school libraries of such varieties as would thrive in their particular locality, thus giving helpful instruction and creating a desire for horticulture and horticultural works. The cost would not be great; a small appropriation from the state funds could be utilized in this educational way to great advantage to the rising generation.

Insects and diseases, noxious and injurious to the best interests of the farmer and horticulturist are being introduced, some of which are from foreign sources, while others are of native origin. These persistent enemies to fruits and flowers are causing great losses to our people, and there should be such restrictive laws passed by our present legislature, if possible, as will prevent these pestiferous enemies or afford relief from them. Other states around us are taking hold of this matter with considerable vigor, and our people should aid and assist in carrying on this much needed work. I could enlarge upon this part of our report by giving you a full list of those insects, diseases and fungous growths that are so destructive to our fruits, grain and vegetable products, but time will not admit.

I have already said enough to satiate your attention and have drawn out this report much longer than I had anticipated when I began.

SECRETARY'S ANNUAL REPORT

FOR THE YEAR ENDING JANUARY 8, 1895.

A. W. LATHAM, MINNEAPOLIS.

Mr. President and Fellow Members of the Minnesota State Horticultural Society:

I have the honor to present you herewith the annual report of this society for 1894, being the fourth which it has been my privilege to prepare. It is a volume of 538 pages and by far the largest this society has ever published. From the standpoint of the horticulturist the past year has not been altogether one of success, and in a measure his efforts have not resulted in that fruition which the heart desires. To the fruit grower the rewards of labor have been light. Late spring frosts and the unprecedentedly hot and dry summer have cut down very largely the returns. With the exception of rare cases where the application of water was practicable, small fruit growing and gardening have been very much of a failure. It is well, here, to emphasize the necessity which has come upon us to devise some practical means of applying water to our gardens and orchards if we shall hope to reap an annual reward for our labors.

As a society, however, our work has been entirely encouraging. Our growth in numbers and the ever widening circle of our influence have this year kept pace with, if not exceeded, that of the previous year, and we may fairly expect, with the continuance of the present favorable conditions, such steady growth in the future. With this satisfactory review and favorable outlook, it is altogether agreeable to meet and plan and provide for the future of so good and pleasant a work as this in which we find ourselves engaged.

In the new departure which was taken in the beginning of the current year, the work of the secretary's office has been radically changed, and it is no exaggeration to say that the labor pertaining thereto has been doubled. The publication of the report as a monthly and the largely increased membership have increased in like proportion the work of the office, and also in a considerable degree the current expenses in connection therewith.

At the annual meeting the executive committee were authorized to investigate the proposal to publish the report as a monthly and if found feasible, to make the change. Through the assistance of Mr. David Ramaley, the gentleman in charge of the public printing and Messrs. Harrison & Smith of Minneapolis, the public printers, which was always very cheerfully given, it was found practicable to make the change, and, so, on the first of February our new magazine, christened "The Minnesota Horticulturist," first saw the light. It was necessary that we should pay the expense of a cover for the magazine, envelopes for mailing, directing, postage, etc. Fortunately, we were able to enter it as second class matter and so secured the privilege of regular magazine postage—one cent per pound. The expense connected with the Horticulturist was for stitching and cover, $100; for directing and mailing, $17; for envelopes and printing, $26; for postage, $27; total, $170. This expense has been met partially by advertisements to the amount of $116. An increase in the

revenue from this source another year should pay this cost entirely.

The plan of publication as adopted provided for an issue of forty pages per month, equalling 480 pages per year, which, with the index, would amount to about 500 pages, the maximum allowed us for our report. On account of this including not only the accumulation of papers and reports for 1893, but also the current reports of 1894, in pursuance of the purpose to make the magazine the medium of carrying to the society the latest news it was found impossible to include within this number of pages all the material on hand; and so with the proper authority, willingly given, a supplement has been published of some fifty pages, including the journal of the last meeting and a few papers left over. This with the twelve magazines, properly indexed, making in all a volume of 538 pages, is the report of 1894 which I have the honor to present to you on this occasion.

In following out the plan as provided, this volume has been sent to all the life and honorary members, and will be sent to all annual members for 1895 as fast as the membership fee is received. The fee of our society being payable in advance, and our magazine being the report of the society, it also is to be sent only to those who have or do hereafter become members of the society.

In considering the future of our magazine, which we believe has come to stay, the serious question that confronts us is a convenient method of publication. For the ensuing year, the public printing of the state is to be done in St. Paul by the Pioneer Press Co. With the library as at present located in Minneapolis, this change will necessarily result in considerable inconvenience. If the amount which is being expended in the printing of our report could be turned over to the society as a printing fund it would enable us to increase the size of the magazine so as to include extracts from other reports and the horticultural journals of the day, as well as current horticultural news, and we should still be able to bind for our membership and others as many volumes as are desirable. To bring about this change would require an act of the legislature, and to the grave importance of this I would respectfully invite your attention.

The publication of the magazine made at once necessary some permanent office, and the rapidly increasing library still further emphasized the necessity. A comfortable and convenient room has the past year been occupied in the Kasota block, an office building in Minneapolis, at a monthly rental of $12, a very low rental considering the circumstances. The accumulation of material in the library from receipts of exchanges, some fifteen monthly or semi-monthly periodicals, which are now being received, the annual reports of kindred societies and other horticultural material contributed to the shelves of our library is rapidly swelling its dimensions, and the time is not far off when even larger accommodations will be required. I know we look forward to the day, which we hope is not too distant, when this society may be the possessor of a home of its own, with suitable office, library, reading room and a hall for its annual gathering. This is an object well worth bearing in mind, and towards which we should bend every energy.

It is unlikely that many of the members, outside of the executive officers of the society, realize the amount of work now being done in the secretary's office. Some idea may be gathered from the financial statement contained herein, the large amount paid out for postage and stationery giving some idea of its magnitude. Amongst the more noticeable items of work in the office may be noticed the following: February 9th, letters were sent to 300 members of the society who had not renewed their membership; included in these letters were membership tickets filled out. On February 15th, letters calling attention to "The Horticulturist" were sent to 100 of the principal newspapers of the state, enclosing return postals, and soliciting free advertising for the society. On March 15th, a letter containing a notice of our fruit list was sent to 300 state papers, asking free advertising, about two-thirds of which number responded favorably. On the first of April a review of the April number was sent for publication to some 200 state papers. On April 15th, a circular letter with enclosed form for reply was sent to all the old members of the society, some 850. Many responded and renewed their relation with us.

The largest work of this character was the advertising done in connection with the scheme for organizing horticultural clubs. A proposal to form horticultural clubs, brought before you at the last winter meeting, was turned over to the executive committee for examination and action, and in pursuance with their plan a form of organization, pledge and topics for discussion at several meetings was prepared and sent out, accompanied by one of the society folders and return envelope, to all the school district clerks in the state, in the neighborhood of 6,000. It was the latter part of February before these were sent out, and too late to expect many such organizations for work that season. President Underwood organized the most flourishing club we know of under this plan, having some 25 or 30 members. If we could secure his services in other parts of the state in this missionary work, similarly good results would surely follow. As far as known only two other clubs were organized, but a lot of good seed was sown, and some of it at least fell on good ground. We shall reap in future the fruits of this investment of some $156, and our efforts in this direction should by no means cease. The above recital of work done does not include a host of lesser circular letters to members of committees and other officers of the society, requests for names, etc., to say nothing of the regular correspondence of the office, ranging from one to twenty letters a day, nor with the personal interviews there with our membership when in the city. The secretary's office is made a sort of rallying point for the horticultural interests of the state, as it is appropriate it should be. All are welcome.

The annual membership for 1894 stands at 522. This shows a steady movement in the increase of our numbers, as appears from the following table: Membership, 1890, 123; 1891, 229; 1892, 300; 1893, 378; 1894, 522. Of these 522, 210 were new members who received the premiums offered by some of our public-spirited members. It is right that some mention should be made of these premiums, as they

were furnished voluntarily and at considerable expense to the donors. The contributors to these were R. J. Mendenhall, Minneapolis, M. W. Cook, Rochester, The Jewell Nursery Co., Lake City, Clarence Wedge, Albert Lea, John P. Andrews, Faribault, and S. D. Richardson, Winnebago City. Six premiums were offered to new members for 1894, which in the judgment of those acquainted with the circumstances is more than should be offered. For the coming year three premiums will be offered to new members, which will be contributed by the State Experiment Station, taking the expense off those who have so willingly borne it the past year. A hearty acknowledgment is certainly due these gentlemen for their assistance last year and, more than that, for their voluntary offer to continue the same gratuitous work the coming year. From this task fortunately we are able to relieve them.

From the above figures it is apparent that about three-fifths of the annual members for the past year were either old members, or new members who did not ask for premiums. A large majority, apparently, of the members for 1893 renewed their membership the last year. The life membership roll has been increased by the addition of three names, Messrs. J. R. Cummins of Washburn, E. E. Harris of La Crescent, and L J. Gjemse of Hader. Four, it is known, have died: Philip Herzog of Minneapolis, and three of the veterans of horticulture in Wisconsin, namely: J. M. Smith of Green Bay, Geo. P. Peffer of Pewaukee and E. Wilcox of Trempeleau. Obituaries of these gentlemen have been published in late numbers of the "Horticulturist." Of the roll of honorary members for a limited period, four have been added this year and six dropped, making a decrease of two, as, also, in the life roll a decrease of one.

The State Fair.—On account of my connection with the horticultural department at the state fair, it is fitting I should speak of it. At the suggestion of the state fair board our executive committee revised the premium list, increasing the premiums on fruit some $200, up to the amount of about $700. The premiums on flowers were also increased about $100, those on vegetables remaining about the same, except a decrease in that offered for county exhibits. A radical change in the fruit list was the doing away with the sweepstakes premium, placing all the premiums in that department on the same basis, namely, that the articles should be grown by the exhibitor. The result of this list, supplemented by work through the "Horticulturist," resulted in the best fruit and flower exhibit, taken as a whole, that has ever been made at the state fair, notwithstanding this was an exceedingly poor year for fruit. We may well feel proud in a society like ours—one that can conquer success under such inauspicious circumstances. A little criticism has been made as to these changes, which should receive attention at the hands of our next executive board. The list was so arranged that nearly the whole amount of premiums offered was taken, and by a larger number of different exhibitors, two of the principal points in view in the revision.

FINANCIAL STATEMENT.

RECEIPTS.

Annual membership fees for 1894	$505.00
" " " 1895	49.00
Life " "	20.00
Advertising in the "Horticulturist"	108.00
Rebate on insurance	4.25
Total	$686.25

DISBURSEMENTS.

Postage	$87.11
Printing, stationery, etc	112.96
Expense of winter meeting, 1894	59.87
Express	13.36
Reporting meetings, 1894	89.25
Expense of The Horticulturist	163.38
One thousand extra Horticulturist	25.00
Office rent	130.00
Office fixtures	15.75
Photo-engraving, T. M. Smith	3.30
Horticultural Club circulars	156.80
Cuts, report 1893	7.50
Insurance	7.75
Badges, 1895	4.50
Sundries	24.15
Total	$900.68

The present method of administering the finances makes the disbursements of the secretary's office large, indeed, almost the total disbursements of the society, not including the secretary's salary This plan saves a good deal of work to all the officers of the society, and the only objection apparent is that all the charges for the society expenses seem to be connected with the secretary's office. Receipts are taken for every expenditure of $1.00 and upwards and placed on file with the papers of the society after having been passed upon and audited by the executive board.

In conclusion, I desire to tender my thanks to my fellow members of this society and especially to its officers, with whom I am necessarily brought in contact, for the uniformly kind appreciation shown for all the efforts I have made for the advancement of the interests of the society, With such support and evident appreciation of efforts one has courage to go forward earnestly in the work.

The outlook for our cause is in every way encouraging, and the line of action upon which we have entered, if persistently continued in, will easily carry this society to the front rank in the list of such organizations. This means that our usefulness and the good we shall do will be greatly and abundantly increased; that our little monthly report will in time develop into a sturdy horticultural magazine of wide circulation; and that in after years, as we look back to this period, we shall feel proud to say that we were then members of the Minnesota State Horticultural Society.

TREASURER'S REPORT.

DITUS DAY, FARMINGTON.

DITUS DAY in account with Minnesota State Horticultural Society for the year ending Jan. 7, 1895.

RECEIPTS.

Jan. 10, 1894.	Balance on hand		$117.90
" "	Received from state ½ annual appropriation		500.00
	Received from A. W. Latham, Secretary.		
June.	Rebate on insurance on library		4.25
"	Ads. in magazine		19.00
"	One-half life fee of E. E. Harris		5 00
"	Life fee of J. R. Cummins		10.00
"	Annual membership fees for 1894 from Nos. 18 to 492 inclusive		475.00
July 10.	Received from state treas. ½ annual appro		500.00
Jan. 7, 1895.	Received from A. W. Latham, Sec'y, viz.:		
	Ads. in Horticulturist	$88.00	
	Letter paper, $1.00; life fee, 5.00	6.00	
	Annual membership fees for 1894 from Nos. 493 to 522 inclusive	30.00	
	Annual membership fees for 1895 from Nos. 1 to 49 inclusive	49.00	$173.00
	Amount received		$1,804.15

DISBURSEMENTS.

Jan. 12, 1894.	J. S. Harris, exp. as ex. com. and delegate	$39.35
" "	R. S. Mackintosh, exp. as vice-pres	1.75
" "	A. W. Latham, fourth quarters salary of 1893	150.00
" "	L. H. Wilcox, exp. attending ex. com. meetings	6.00
" "	O. F. Brand, exp. to ex. com. meetings	9.60
" "	J. R. Cummings	3.00
" "	J. M. Underwood, salary as president	25.00
" "	Ditus Day, salary as treasurer	25 00
" "	Ditus Day, exp. of treasurer's office	9.39
" "	L. E. Day, exp. as vice-president	1.55
" "	Premiums awarded at the winter meeting of 1894 at Minneapolis	110.00
April 10.	A. W. Latham, first quarters salary, 1894	150.00
June 22.	A. W. Latham, exp. of secretary's office, etc.	669.43
"	Premiums awarded at summer meeting, June 21, 1894	60.00
June 20.	A. W. Latham, second quarters salary	150.00
Sept. 19.	J. S. Harris, exp. as ex. com	10.16
"	A. W. Latham, third quarters salary	150.00
Jan. 7.	A. W. Latham, exp. of secretary's office, etc	231.25
	Balance	2.67
		$1,804.15

All of which is respectfully submitted.

LIBRARIAN'S REPORT.

A. W. LATHAM, MINNEAPOLIS.

The library has received about the usual number of additions this year, the titles of which have been given in the "Horticulturist," with the exception of a few received in the last month, which will be noted in an early number of the magazine.

The additions number about sixty-five, not including the duplicates which have been received from several of the states, notably Wisconsin, Ohio, Massachusetts, New Jersey, Nebraska and Ontario, and one or two extra copies from several other states.

About eighty paper-bound volumes belonging to the permanent library have been bound in cloth this year, making quite an improvement in the appearance of the shelves.

The accumulation of magazines and periodicals coming into the office in the way of exchanges will soon call for more shelf-room, or the banishing in large degree of the surplus stock of our own reports. The proportions reached by our library, and the labor and expense connected with its increase and care, is a matter which may well occupy your attention, and it would seem in place to ask of the lawmakers of our state for a small appropriation to meet this expense. It would certainly be money well expended and yield the best results.

Our permanent library now numbers about five hundred volumes, not including in this count any duplicates. It can be easily and rapidly increased by devoting some time to it, which the increasing duties of the secretary's office during the past year have prevented my giving, as I should have wished.

There have been sent out from the office this year, by mail or personal delivery, a cloth bound copy of the report of 1893 to each one of our membership, in all about 550 copies. One hundred and thirty-seven packages of reports, generally three volumes in a package, have been sent from this office by express during the past year. Many of the members in the state have preferred to pay the express charges on three volumes rather than to receive one by mail.

ASSISTANT LIBRARIAN'S REPORT.

E. A. CUZNER, MINNEAPOLIS.

Horticultural reports stored at Pillsbury Hall, State University, Minneapolis.

Year.	Paper.	Cloth.	Year.	Paper.	Cloth.
1876	220	....	1886	165	....
1877	....	....	1887	....	....
1878	....	....	1888	42	....
1881	1435	....	1889	96	....
1882	260	66	1890	290	....
1883	148	380	1891	50	150
1884	222	....	1892	1030	450
1885	375	....	1893	575	375

The reserve. Stored at same place,

Year.	Cloth.	Paper.	Year.	Cloth.	Paper.
1866-73	42	....	1884	43	....
1874	....	50	1885	....	50
1875	....	29	1886	31	36
1876	....	50	1887	....	47
1877	....	48	1888	42	....
1878	20	24	1889	2	48
1879	....	8	1890	13	50
1880	26	....	1891	50	....
1881	46	...	1892	50	....
1882	60	....	1893	50	....
1883	50	....			

There has been some thirteen files sent out from here besides some twenty back numbers to as many different individuals.

Respectfully,
E. A. CUZNER.

REPORT OF COMMITTEE ON LEGISLATION.

J. H. HARRIS, CHAIRMAN.

The time has now arrived when the demands upon this society are so great for information on horticultural topics that more money is needed to carry on the work successfully. The membership is now so large that it requires of the secretary the whole or the major part of his time; the publication of our reports in a monthly isssue also makes added duties for the secretary to preform.

Special bulletins should frequently be prepared and sent out, when the circumstances demand, to inform and warn the people in cases like the great "model one hundred dollar orchard" swindle perpetrated by an Illinois nursery company upon the farmers of the southern part of our state within the last year. Now, therefore, your committee on legislation recommend: First, that this society ask the present legislature for an increase of the present appropriation to our State Minnesota Horticultural Society to a sum commensurate with the demands upon our society at the present time. We would name as such an amount $2,500 per annum.

Second. The advisability of having the printing and binding of our horticultural reports done by the state printers is questionable, when upon investigation it can be demonstrated that the money expended by the state, as now done, could be much more economically used if the society had full power to contract for this printing by advertisement and to be given to the lowest bidder.

MINNESOTA STATE AGRICULTURAL SOCIETY.

RESOLUTIONS THERETO, ADOPTED, JANUARY 9, 1895.

Resolved by the Minnesota State Horticultural Society:

(1) That the present method of apportioning the membership in the State Agricultural Society is unjust to the representative agricultural bodies of the state.

(2) That the proper method of forming the State Agricultural Society is by delegates from the various county and state societies, proportioned according to the number of members in said societies.

(3) That the following would be a just and reasonable basis of forming a State Agricultural Society:

Each county agricultural society, the State Horticultural Society, the State Dairymen's Society, the State Forestry Society, the State Bee-keepers' Society and similar state organizations, shall be entitled to one delegate to the annual meeting of said State Agricultural Society for each of its twenty-five members, provided, the required annual membership fee in said societies shall not be less than one dollar. These delegates may be represented by proxies. Life members in said State Agricultural Society to have all privileges they now enjoy.

DISCUSSION.

Pres. Underwood: If there are any of you who do not understand this matter you can ask for an explanation.

Mr. Brackett: What is the present method?

Pres. Underwood: I believe the president of the State Horticultural Society, the president of the State Dairymen's Association and three members from each county agricultural society are entitled to membership. There are also certain life members that are entitled to vote.

Mr. Harris: Perhaps I am better acquainted with that association than any one else here, as I served upon the board some twelve years. When they first established the agricultural society it was composed of two delegates from each county society. Then they began to have paid life members that had a right to vote, and sometimes it became necessary to go to quite a length to get a good man into the society. Then when they organized a few years ago, they found that the horticultural society had four votes. They found that the horticultural influence was getting too strong against the horse influence, and they voted the horticultural representation down to one. We are entitled to but one vote, while the county agricultural societies are entitled to three, and the dairy association to three and the bee-keepers' and kindred organizations have but one vote, and as we are stronger than the whole society put together, I think it is an unjust representation. They cut our vote down because our influence was against the horse.

Mr. Brand: There is one word in those resolutions I do not like, that those delegates may be represented by proxies. I do not understand whether there is any binding force upon it or not, but I do not think we should permit that clause to go in. I do not think it is a good idea to have delegates represented by proxies.

Mr. Wedge: It strikes me that if the agricultural society meets at the same time we meet each year that we would not want to spare one out of every twenty-five of our members to attend the meeting. I do not know of any other reason why they should vote by proxies.

Pres. Underwood: I think we may recommend whatever we have a mind to. We could not legislate for them anyway. There is a danger in the use of proxies. I do not know that there is any danger in allowing the use of proxies except where some one is interested in seeking an office in the society. The president of this society cannot be present at this meeting and the one in St. Paul at the same time. There ought to be some way in which this society could be represented. I cannot be there and be here too. Our society could have no representation in the agricultural society today if they had not allowed me to send my proxy there. I wrote out a proxy and sent it to Wyman Elliot, and I think they will allow him to use it. I think the proxy matter will take care of itself.

Mr. Harris: I think we should go against the proxy business. I do not believe in proxies. I have attended more than one meeting where it was used simply as a political machine instead of an agricultural society, and I think until the whole thing is changed so that we shall have our proper representation there we cannot expect much. In proportion to our numbers we ought to have fifty delegates.

Mr. Brackett: Do I understand that the meetings of this society are held at the same time as that of the agricultural society?

Pres. Underwood: It unfortunately happens that the State Agricultural Society holds its annual meeting on the second Tuesday in January, and our meeting begins on the same date; and the only representation our society has is the president, unless they allow us to send a delegation to represent our society.

Sec'y Latham: This matter of proxies has two sides to it. The fault found at present is that our society is not fully represented in proportion to other societies; we have one vote for six hundred members, while other societies have three votes for a dozen or two dozen members. Supposing we had six hundred members, as we have now, that would mean that we were entitled to send twenty-four delegates. That would mean a large burden of expense on this society to cast that vote, if the delegates were not allowed to be represented by proxies.

General Fruits.

OLD IDEAS IN A NEW DRESS.

J. S. HARRIS, LA CRESCENT.

Mr. President: Unfortunately, I did not see the program of this meeting until last evening, and I did not know what papers were in it. I do not know whether what I have written will fit the subject or not. I know a new dress on the old ideas will not fit very well, but I hope the horticulturists of Minnesota will make all due allowance for an old fogy who dates way back in the past ages, and the reason they ought to make this allowance is because you live in an age of progression in which these things are marching on with such gigantic strides that the old fogies cannot catch on and are still hanging in the rear with their old ideas. The first reference you find of me is in "Wedgwood's Treatise on Cider," several hundred years ago, where you will find an account of one Harris who did a wonderful thing in the planting of some apple trees, and what he did is still a benefit to this day. Of course, you must make some allowance, but you must bear in mind that I believe pretty much all I have to say, and I may put a new dress on some things I have to say. (Applause.)

The title of the subject given me does not quite fit what I expected to say upon this occasion, and, doubtless, some things I shall have to say may not quite harmonize with your theories upon the subject, but I trust you will make due allowance for what you may consider to be my erroneous ideas and give me credit for coming honestly by them. I have now devoted more than half a century to the observation, research, experiment and study of practical horticulture, and have for nearly forty years by precept and example and through the press and horticultural societies, by exhibits at fairs and labors in farmers institutes, tried earnestly to point the way to success and persuade the people of the Northwest to plant fruit trees and care for them for the benefit of the present and future generations, and very generally advocated "old ideas" that have deep and broad foundations laid in the experience of past ages.

It was an old idea of our forefathers that a tree to be transplanted should be carefully dug with as nearly as possible all its roots

intact, and that it should be reset without any unnecessary delay, with the roots very little deeper in the ground than they were where it originally grew. A reason offered against deep planting was that the upper soil or mould was always richer than the next soil or mould below, that the trees would start to grow sooner, make a sturdier growth and bear fruit earlier, and from the nourishment received from the surface soil they would acquire a better root system and corresponding tops and produce more and larger fruit of a richer and better quality. Here in the cold, dry Northwest a "new idea" that the true road to success lies in deep planting has so many advocates that the people are beginning to follow them blindly, some digging holes and shoving the roots down from one to two feet below the surface. Among the pleas made in favor of deep planting are protection of the roots against drouth and winter-killing and holding the trees in a more upright position, but for neither of these is it any remedy, but rather the reverse.

The disadvantages or objections to deep planting are, first, the roots are placed below where the surrounding subsoil has been broken and put in condition to properly feed the tree through the roots, and the tree is starved to death or receives barely nourishment enough to sustain life, until, by a forced effort, it can throw out sustaining roots near the snrface where nature designed them to be, or until the roots curve upwards in their growth and get into surface soil. Second, it is not as sure a protection against drouth as shallower planting with proper mulching or frequent, thorough cultivation, for the reason that our drouths are so long and intense that the earth becomes dead dry below where any of the roots reach and, consequently, the first rains that break the drouth do not carry moisture down to the roots for weeks afterward. Third, that deep planting was not a remedy against winter killing was proved by the great disaster that overtook us in 1872 and 1873. That winter followed a dry fall, with only two or three inches of moisture at the surface, and seven feet dry as dust below, when the ground froze up solid. In that winter thousands of trees were lost by root killing; only those escaped that had their roots in the moist surface soil. I lost about two acres of bearing orchard that was growing on a little hill, where by plowing the soil had been raised in the rows over the roots from eight to ten inches deep, excepting a few trees which I had made a broad level place by moving the ridge of earth to the lower side to level up. In my vineyard every root of my grape vines from below four inches of the surface was killed, and such of the vines as were covered before the little surface moisture came were killed out entirely. From that time I have never applied winter covering on a dead dry surface.

In the winter of 1890 and 1891 I had another lesson in my experiment nursery. One-half of the trees were crown-grafts and set with only one bud of the scion below the surface. The remainder were put upon a lower portion of the seedling root and planted deep, and the early snow melted away and made the surface soil quite wet. We lost scarcely a crown-graft, but a considerable portion of the others were killed to the point of union of root and graft growth.

That extra deep planting does not tend to prevent the trees from leaning from the prevailing winds, I have long since been satisfied of. That the tops of deep set trees are more liable to winter killing looks reasonable because the growth would not naturally cease so early in the fall.

THE NEW DRESS.

Plant trees only that have been carefully dug and properly handled, with as many of the roots intact as possible; prune back the tops so they do not overbalance the root. Set in holes large enough to receive the roots in natural position and no deeper than the whole ground has been broken, or plowed and ameliorated. Be sure that the fine soil comes in contact with the roots at every point and pack it firmly about and over them, and when finished let there be from three to four inches of fine mellow soil over the roots. The tree should stand from one to four inches deeper than it did in the nursery, and according to the nature of the soil in which it is set—for a very loose soil deeper than for clay loam. If the location is such that more earth is needed, put it on top instead of making the hole deeper. Another of the "old ideas" about planting orchards was to set the trees to stand from thirty-two to sixty feet apart, so that they could be plowed and dug about and dunged and give the roots a chance to run out in search of food without rubbing some other tree; so that the tops would develop broad and spreading and be able to support much fruit, and so that the sun and air would get in and give color and quality to the fruit. In this state a newer idea has crept in, and of late years close planting is becoming an almost universal practice. One plea for it is that it may afford protection to the trees; and yet those who claim it disapprove of the protection afforded by timber belts and windbreaks.

For small gardens and dwarf varieties it may be best, but for orchards too close planting will not prove a success. Fruit-bearing trees need digging about, plowing, cultivating and manuring, as much now as they did in the olden time. In a few years both the roots and tops of close-planted trees intersect each other and begin carrying on a system of robbery, robbing the soil of fertility and the fruit of air and sunshine. Shade of the ground and lower branches invite disease and premature death, and the trees soon lose much of their vitality and languish, or starve. They are not able to produce large crops of fruit or bring any to the greatest perfection, except upon the topmost branches. The close-planted orchard furnishes the best of environments for the propagation of scab and other fungus diseases that are detrimental to fruit growing, also extreme drouths are more damaging than to the close planted orchard.

The new dress is to run the rows of trees north and south, with the rows from thirty to sixty feet apart, the trees in the rows standing from twelve to twenty feet apart to protect each other. They will still get about all the benefits afforded by the old style of distant planting and give the same opportunity for cultivating, manuring and getting about by only going between the rows. By this system one-half of the trees may be removed when they get to crowd-

ing, or the orchard may be renewed by setting a row of trees between and removing all of the old ones after the new commence fruiting.

An "old idea" was to prune the trees to have a trunk six to nine feet high and keep the heads thinned out by a periodical pruning. The "new idea" in the West is to set the trees and let them branch from the ground up like a currant bush, or with very short trunks, and never afterward do any pruning. Well, it is hardly necessary, for the lower branches, in reaching upward for the blessed sunlight, soon become separate trunks, with a tuft of branching on the end, and if they are ever loaded with fruit, the winds and weight have a good leverage, and the pruning is complete. Our new dress suited for this climate would be to start the head of the tree at from three to four feet above the ground, according to variety and location, and prune or train to keep a well balanced top, not too heavy for the trunk and roots, and reasonably open. The "old idea" generally favored setting strong, thrifty young trees raised from seeds and afterwards grafting or budding them in the top, or where the top was to be started. But we learn from ancient writers that some parties did dig up the young seedlings in the fall and graft them just above the crown, doing the work by the fire in the winter. Root grafting by the present method was not very generally practiced until about sixty years since. For the climate of this state it is undoubtedly the best method for raising trees, because few seedlings are hardy enough to make good trunks, and the varieties we can grow here must be extremely hardy. If it becomes necessary or desirable to top-graft trees it should be done only on the hardiest varieties that have first been propagated as root grafts.

In the olden times large commercial nurseries such as we have at the present time were unknown, and novelities were indeed rare and the traveling agent had not been invented. In almost any neighborhood some enterprising man would keep a small nursery, and the price of a good tree was about twenty-five cents, and the man who wanted trees generally went to the nursery for them. Now we have single commercial nurseries large enough to supply the state, and agents to sell the trees who are smart enough to convin ce the ordinary planter that the nursery they work for has all there is in the world that is good for anything and has mastered the true secret of propagation, so that the trees they have to sell will stand all climates and bear no end of fruit. So plausible is their story that some have hesitated about buying, lest the trees should live so long and bear so heavy they could not find any use for the fruit. Wonderful things are some of these novelties. A few years since a man came to me at the state fair and told me that my time for carrying off the large premiums at the fairs was short for he had put in an order for a quantity of trees—peaches budded on thorn, pears on ironwood and apples on French crab stock, etc. Well, it did not materialize, and fruit grown on the old kind of trees still takes the prizes. It is certain that skilled nurserymen who make it their business to grow and supply trees to the planters, can raise better trees and furnish them cheaper and, as a rule, better than individuals can raise for themselves; and when they keep up with the times, and furnish only such as are best for their customers, they ought to be liberally

patronized. I would not put a new dress on these old ideas further than to say that the nearer at home the trees are purchased or procured, all other things being equal, the better it will prove for the planter; and I would suggest that every man who intends to plant trees for fruit will find it a good investment to first become a member of the State Horticultural Society.

DISCUSSION.

Mr. Dartt: I would like to inquire if the Harris mill was not wound up until last night and has ground out such a good grist, what would it have done if it had been wound up a week ago? (Laughter.)

Mr. Harris: The wind might have failed on it.

Pres. Underwood: I think Mr. Dartt could probably make the proper estimate; he has been in the windmill business so much that he can perhaps figure that out better than any one else. I do not know what the basis is, whether it is so much wind to the square inch, or the height, or what it is, for Mr. Dartt has not told us how he gets his estimates on the power of windmills. I think we must have another article on windmills. This paper is open for discussion, and let me say right here that we expect to take a paper of this kind and discuss it thoroughly, make suggestions, ask questions and bring out all features that may be of interest to us. Do not hesitate to take part in these discussions; it will enliven our meetings and make them all the more interesting. I do not know that any one can possibly answer Mr. Dartt's question, but I think some of you may have questions to ask Mr. Harris which he can answer.

Mrs. Stager: I would like to ask Mr. Harris about planting trees, —if apple trees can be successfully planted on new land the first season.

Mr. Harris: I think it can be done with success. Is it timber land?

Mrs. Stager: No, it is grass land.

I have a son who has a farm on which he wanted to set out some trees and fruits. I furnished him the trees and I put in enough for an acre of orchard and 1,500 strawberry and blackberry plants. He had nothing but new land, sod, to plant them in, but he chopped it up fine with a disc harrow and I set the trees out. Not one died during the summer, and they made a growth of from twelve to eighteen inches. I do not know that I would do that anywhere if I had my choice between such ground and land that had been cultivated two or three years—but you must not forget the mulching before the ground gets dry.

Mrs. Kennedy: Did you say that the tree should not be planted any deeper than the ground is plowed?

Mr. Harris: I do not think the hole should be deep; not any deeper than the ground is plowed. One of the reasons for that is that if you have a clay subsoil and you work the ground no deeper than it is plowed, it acts as a sort of a basin to hold the moisture and it does not dry out quick enough to feel the drouth. Nature provides that some roots should run down. Large roots are pretty near the surface of the ground. In hickory and other trees the roots grow small very fast after they get out of the surface ground.

Mr. Dartt: I am not satisfied with the answer of my friend Harris in regard to the depth that a tree should be planted. The question was asked whether it should be planted below the line where the land had been plowed, and he objected to digging the hole below that line. I believe it is an absolute necessity that we should dig a hole as much as eighteen inches to two feet deep, and make a good mellow soil, and make a good bed, if it is two feet deep, and if three feet deep it will not do any harm, and then set out your tree. The moisture settles in there, and that is what we need in this climate. Such a hole holds the moisture and the tree will not die nearly so quick as if there was no moisture. There are some men who have had the best success by digging a large hole and making a good rich soil for quite a distance around and planting the tree in there. I once raised a bushel and a half of apples from a tree three years after planting it. I dug a hole as much as six feet across and two feet deep, and I made a good bed and planted the tree in it. I planted the Pumpkin Sweet, and in three years after I planted that tree I picked one and a half bushels of apples from it. They were bouncing big apples, and I believe the more pains you take in making a large hole and making the soil mellow, the better luck you will have.

Mr. Moyer: Mr. Dartt wants to make the holes the width of the orchard.

Mr. Harris: I want to ask Mr. Dartt if he puts the roots clear down to the bottom of the hole. I do not care how wide or how deep he makes the hole if he puts the tree where he ought to put it; that is all right. It will do no harm to dig that kind of a hole until nature puts roots there, the kind she wants. There is no doubt but that is all right. Let me tell you in this connection there is a fellow down my way that sells trees. He thinks he knows all about the tree business. He set out two hundred trees last spring and some grew three or four inches and some died. I asked him how deep he dug his holes. He said he dug his holes and put them down eighteen inches deep. You see he put them down in that hard clay subsoil, and there had been one heavy rain, and the rain and wind made a regular funnel around the tree and the tree leaned the way the wind blew last.

Mr. Dartt: As long as that reporter over there is figuring the way he does I want to be careful what I say. I said I raised those apples three years from the time of planting the tree, and I want to say it was four years. I do not want to make it too big.

Pres. Underwood: We all thought he had gotten away from the truth. I understood him to say he raised the sweet pumpkin. We raise our pumpkins on vines. (Laughter.)

Mr. Richardson: There is a great deal of difference in localities. You might dig a hole two or three feet deep and still the water would settle away. In our locality in the dry summers the ground is dust just as deep as it is plowed, and if we want to get at the moisture we must go below that point. I have had good success in planting deep; it works to a charm on the prarie. I would rather do no mulching, unless I set the trees in sod. I have had good success in setting evergreens in sod by mulching. I set my evergreens

deep, because I count on getting the moisture from below. If the moisture did not come from below in our locality we would lose all our crops; we must depend on getting our moisture from below. So in our part of the country we find a dust blanket with deep planting gives us the best results.

Mr. Brackett: Is it not pretty hard to get young roots to penetrate your soil?

Mr. Richardson: A year ago last fall I dug up some Wealthy trees that had been set out three years, planted five or six inches deep. I dug an underdrain where they had been planted and down at a depth of four or five feet I found roots as large as wheat straws growing down into the gound.

Mr. Brackett: What subsoil?

Mr. Richardson: Clay. Our subsoil is porous. Our soil sometimes freezes four and five feet deep. The frost does not go out early, but when it does the soil crumbles to dust.

Mr. Wedge: It seems to me there is a great difference in trees. I think it is not a matter of very great importance with ordinary trees, forest trees, shade trees, etc., at what depth they are planted, but with our grafted trees it is a matter of considerable importance that we get the tender roots down to a considerable depth so that they will not be affected by severe freezes and thaws. When we come to dig our nursery trees we find that the roots have penetrated right straight down in that stiff yellow clay for a depth of several feet, and I believe Mr. Richardson says those he had set three years had grown down to a depth of five or six feet. So there must be a great advantage in getting those tender roots which are feeding our fruit trees down a sufficient depth. For myself I am in favor digging the holes from two to two and one-half feet deep. I set out one thousand trees; I plowed a deep dead furrow and then replowed the bottom, then I dug pretty deep holes. Our soil is very stiff, heavy clay, and yet those trees have made a good growth. I do not think they have made as good a growth thus far as they would have made by Mr. Harris' method, but I think the next ten or twenty years they will make a better growth than if planted shallow.

Mr. Harris: In a dry winter the roots will kill wherever the soil is dry, unless it is an uncommonly hardy variety. I saw trees in the nursery of Wilcox & Son; I saw them dig them up and pile them in stacks larger than hay stacks, and all the roots that were alive were the little roots, and those little roots were alive just as far as the little moisture from the rain or snow had penetrated the soil. Just as far as that penetrated the frost had no effect on the roots, but below that they were black. The same thing occurred in Wisconsin another winter that I know of. Mr. Wedge had admitted that they do not grow as fast as under the plan I use, and if he should be overtaken by one of those calamity winters before those trees have formed sufficient roots he will loose his trees. They have not strength enough until they form good roots to withstand those hard winters. But if I lived where Mr. Wedge and Mr. Richardson live I would perhaps set my trees deeper than I do where I live. When you set a tree four inches below the surface, you want a good

soil below for the roots to form in. Mr. Richardson's trouble seems to be that the soil becomes like dust, and I suppose if planted a little deeper the heat of the day and the cool of the nights draws moisture and supplies the tree.

Pres. Underwood: The question was asked in regard to planting on new ground. I want to say a word about that. The past summer I visited Mr. Somerville's place. He showed me a Duchess tree he planted in 1860, thirty-four years ago. He said he cut off the hazel brush and planted the tree in that ground, prepared in that way without any plowing, and the tree I was looking at seemed perfectly sound, and it was surrounded by a good many trees that were retarding its growth, yet they seemed to exert no bad influence over it. I cut off a limb of it and brought it home as a curiosity; it has Mr. Somerville's name written on it and the year it was planted. It seemed so strong and healthy I felt like taking off my hat out of respect for it. It had grown so long that Mr. Somerville said he was next spring going to cut it back so as to make it start a new growth, but the body and every limb seem to be in perfect condition.

In regard to this depth of planting. I think you have developed an important point in this matter, and that is, it depends upon the soil the tree is planted in. I do not think I would go down two feet. There are some of our members living over near Rochester that planted their trees two feet deep and have had the best success of all. We lost a great many trees by root killing, and I think it was caused by the exhaustion of moisture. The moisture was entirely exhausted in the soil, and when the moisture is exhausted the tree is really dried out. Some trees are more easily affected than others. As Mr. Wedge says, trees on their own roots will stand more drouth than those which are grafted. Mr. Harris says it is moisture near the ground that keeps the roots alive. My observation agrees with the story of Mr. Wedge, that it is not the roots of the hardy stock which are affected, but it is the roots that are formed on the scion or body of the tree where the graft is put on that are injured, but below that the lack of moisture seems not to affect the roots. Whether it is on account of the subsoil or whether it is the nature of the stock it is grafted on I do not know, and I think if there is any advantage in deep planting, it is simply to get it down where there is moisture. If you plant a tree near the surface, and you have a long, hot, dry summer, the moisture near the surface is all evaporated, and when it freezes it freezes up dry, and that is where the trouble of root killing comes in.

Mr. Harris: This mulching business must not be forgotten. One other point I was going to make while we are on this subject. Some people say that if the roots are way down they will not be so likely to kill out in the winter. About fourteen years ago I was putting out some trees, and I had budded quite a number of trees upon seedling stock of doubtful hardiness, just a little above the ground. It was on Haas apple trees. When I took them out of my little nursery, I wanted to set them out so the seedling stock would be below the surface of the ground, about six inches below the place where they were budded. Then came on the winter of 1884-1885 and every

solitary tree in that row came out dead the next spring while the next row of ordinary varieties are standing yet. Those trees that were put down so deep did not get ripened up enough and the winter laid them out.

Mr. Brackett: You do not think it was the lack of moisture?

Mr: Harris: No, it was not the lack of moisture.

Mr. Kimball: In reference to planting in new ground, I wish to say that in South Dakota, in 1883, I met a gentleman who was setting out trees on the unbroken prairie, and when I expressed a surprise at his trying to do so he assured me that he felt certain of success, and then he told me how he was doing it; and while I have never been able to visit that orchard, I have found upon inquiry that the man has made a success. I think the orchard contained some fifty to sixty acres, and while the man has since died, he lived to reap large rewards for his trees. It was in Turner county, between the towns of Hurley and Parker. I have never had an opportunity to visit it, but I found out through other sources that he made a success of it. While I do not think it is the best way to set out an orchard on wild prairie sod, yet I wish to mention it so that our people may not be discouraged from setting out an orchard on the prairie.

Mr. Harris: Was his name Smith?

Mr. Kimball: No, it was not Smith. I cannot recall his name just now.

Mr. Harris: I would like to know how a man by the name of Smith succeeded with his orchard. He was situated somewhere about Madison, South Dakota. He set his trees out very deep and calculated to work down to where there was moisture. I would like to know if anybody has ever heard from him about it.

Mr. Dartt: I would just as soon dissagree with my friend Harris as not. He said we must not forget to mulch—you must remember the mulch; and while I approve of mulch, yet in all my experience I have found that good cultivation has been fully equal to mulching.

Mr. Harris: That is a mulch.

Mr. Dartt: Well, if you agree with me it is no fight. No fight, no fun. (Laughter.)

Mr. Richardson: I knew a man some five or six years ago who set out his trees in prairie sod, and I think he mulched them. I never saw his trees, but I have been told that his trees did first rate. He did not intend to set them in the sod, but he did not have the ground broken where he wanted to set his orchard. I know I have set evergreens in sod, mulching twice a year, and I have had very good success.

Pres. Underwood: Mr. Somerville is a firm advocate of mulching. He mulches his whole orchard, I was surprised at the fineness of his mulch. He has talked about drawing the old straw stack on the orchard, and I could see where there had been some three years ago. What we want to know is what are the disadvantages of mulching? Why do you say, do not mulch? I am a firm believer in mulching, but I have carried cultivation to excess, that is, deep cultivation. If you cultivate, do not cultivate too deep; that was my mistake. If there is any harm done by mulching I want to know why and how it is done.

Mr. Dartt: Does any one object to mulching?

Pres. Underwood: I thought I heard some one object to mulching. I have heard it objected to, and I thought some one here this morning had objected to it. I have heard it objected to on the ground that it brought the roots of the tree too near the surface of the ground, and unless the mulching is kept up the roots become exposed and in this manner are easily killed out. Perhaps, I was mistaken in regard to the objection I thought I heard.

Mr. Crandall: I would like to ask Mr. Harris if he would mulch in the fall after a severe drouth.

Mr. Harris: If I should mulch in the fall after a severe drouth, I should put some water on the mulch. I put down some Delaware grapes and covered them with leaves, and every one was killed because there was no moisture in the soil. If there had been a mulch on during the summer, I should not have lost them.

Mr. Dartt: I do not like to keep jumping up all the time; but, now, if you go to work and bring up the dangerous thing in regard to mulching—you must first find out whether the ground is dry or not. But I think the only safe way is to mulch every year; mulch your orchard every year; mulch it with manure; put on a reasonable amount of mulch, and I am willing to risk it. When the season is dry you want the mulch any way, and the only safe way is to put it on every year. Then, if some of your trees are Wealthys you will kill them. If you mulch, mulch with straw, or something that has not got much bones in it. Those Duchess you want to mulch with manure. Cover the ground with rich manure, put on more; spread it out and put it all over the ground; and we can do this where an orchard is reasonably closely planted, as all orchards should be.

In regard to our friend over here talking at Farmers' Institutes, he talks for effect. I expect I do here. We talk about things we do not know. I mean to take my own medicine, and if I do not take medicine Professor Harris will poke it down me. (Laughter.)

Mr. Brackett: I would like to ask Mr. Dartt if he believes trees in rich soil are more apt to blight.

Mr. Dartt: Yes, sir.

Mr. Harris: Don't you believe it?

Mr. Richardson: I believe that there is a wonderful difference in locality. Mr. Dartt believes in killing the Wealthy. If you kill my Wealthy, you kill all my orchard. Manure does not seem to hurt it a bit.

Mr. Dartt: My friend told me that the Wealthy orchard that was doing so remarkably well was in grass sod.

Mr. Harris: I have heard all manner of theories, and I have practiced every theory I ever heard of, (laughter) but I do not believe the Wealthy will blight any quicker on good soil with the fertility kept up to the right pitch, I do not believe it will be killed by blight any quicker than it will by starving it to death. Blight is something we cannot account for, and it comes through atmospheric conditions, and, perhaps, also, through the condition of the tree itself. I have had the worst kind of blight on trees set in grass, and some trees on cultivated ground blighted. I have a Duchess that has grown

twenty-five years, and it was the only tree that had no blight on. I do not want to take up your time to tell you what it is. The year 1893 was pretty dry, and the majority of our trees were not in the best condition to go through the winter, and when spring opened, there were certain atmospheric conditions which started the trees to budding; it started the sap circulation, and the trees commenced to grow, unfortunately, before the frost was out of the ground; and then there came a sudden check, and there was nothing to carry on the growth of the tree, and the blight set in. I think the drouth of the year before had something to do with it.

Mr. Brackett: I would like to hear a discussion on growing the tree with several trunks. I adopted the plan of growing my trees in that manner.

Mr. Dartt: Let us ask Mr. Brand.

Mr. Brand: I do not care to say anything on that point. I was about to make a remark on the other branch of the subject. I was reminded while you were talking about it of a certain part of nature which Mr. Darwin calls "the law of economy of growth," when there is no necessity for nature to put forth certain efforts. When you plant a root deep you put it below the action of the air, and it is not inclined to fortify itself against the inclemency of the weather so much as when it is higher up and more exposed to the atmosphere; and it is less liable to kill the nearer it gets to the surface of the soil, where it is more exposed to the atmosphere. You may expose it below its normal conditions if the roots were exposed and hardened up, and it may be able to resist more cold and changes than otherwise. I think it would be a good idea to dig down in the fall of the year and remove a portion of the earth. I do not believe in having several trunks. The best results come from trees having trunks three or four feet high.

Mr. Harris: If members will look back through the old reports of this society, they will find that twenty-five years ago I told them how I managed my orchard. About September I went into the orchard and cleared the mulch away from the trees and tramped the earth hard around the roots of the tree so that the roots might become accustomed to the weather, and when winter set in I would put my mulching back again. Mr. Brand saw a tree in Mr. Budd's nursery where the hens had scratched under the roots of a tree so they could make a nest under the center of the tree, yet that tree was not hurt in the root or top.

REPORT ON SMALL FRUITS.

THOMAS REDPATH, LONG LAKE.

The past season has not been very favorable to those engaged in the growing of small fruits on account the of extreme dry weather that lasted all through the small fruit season, making the crop a light one. Strawberries were only about a third of a crop. The varieties that have done the best in this neighborhood, so far as I have been able to learn, are Captain Jack and Bubach No. 5. Raspberries were a fair crop and sold at good prices. Marlboro is the most pop-

ular variety of the red, but we think Shaffer's Collosal will take its place in a few years, at least in the Minneapolis market. Souhegan and Hilburn are the best early blackcaps. The late blackcaps did not amount to much this year; the most of the fruit dried on the bushes. The blackberries did the best of all, and with me were nearly a full crop. We consider the Snyder the best early variety, and Ancient Briton or Stone's Hardy for late. I have found out that blackberries do the best without cutting them back. Give them good cultivation, and every berry will mature and be large ones, likewise. Gooseberries and currants did fairly well and prices were good.

In order to be successful in growing small fruits, they need winter protection and thorough cultivation all through the growing season. We may not be able to grow large crops of strawberries without irrigation, but the past season has proved that with very little rain and good cultivation, we can grow raspberries, blackberries, gooseberries and currants that will net us a handsome profit.

SMALL FRUITS.

M. C. BUNNELL, NEWPORT.

We have had two unfavorable seasons for the raising of small fruits in Washington and Dakota counties. Where a thorough cultivation was kept up, the crops withstood the drouth better, the stirring of the soil having a tendency to produce moisture. Strawberries were not half a crop; beds were burned up by the severe drouth, especially the beds that were planted in 1893. Beds planted in 1894 were better.

Raspberries and blackberries did not mature on the bushes. Currents were a better crop and brought a good renumeration. The worm didn't seem to injure the bushes as badly as in the year 1893. I think it will pay to keep up the currant industry, especially around the twin cities, as there is usually a good demand for the fruit. A number of the farmers have rooted them out on account of the worm, but the grower who will attend to his bushes, use a sufficient amount of hellebore, and give them good cultivation with plenty of manure to enrich the ground, will be amply repaid. Gooseberries are being planted to some extent.

As to varieties of small fruits that do the best in this section. Strawberries: Wilson, Crescent, Jessie and Warfield; Parker Earle and Bederwood are planted some. Raspberries: Turner, Cuthbert, Brandywine and Philadelphia for red; Early Ohio and Gregg for black. Blackberries: Ancient Briton and Stone's Hardy. Currants: Red Dutch, Cherry, North Star, White Grape. Black currants: English. Gooseberries: Houghton and Downing; a few of the Industry are being tried.

As to the method of cultivating the small fruits, I would plant strawberries on well fertilized sod three and one-half feet to four feet between the rows, and eighteen inches in the row. Fertilize the pistillate varieties every other row with staminate varieties; cultivate in the matted row system. Cover the beds late in the fall with swale grass if it can be procured, if not, use straw with the chaff

thoroughly shaken out of it. Would be careful and not uncover too early in the spring, so as to escape late frost.

Raspberries and blackberries I would plant seven feet between the rows and four feet in the rows and keep them thoroughly cultivated up to the time they are ready to pick,so as to produce as much moisture as possible, that the fruit may mature. The old canes can be taken out at any time after the fruiting season is over. Before the ground freezes in the fall lay down the canes and cover with earth for winter protection.

Currants and gooseberries plant at least six feet between the rows and four feet in the rows. Manure thoroughly, and cultivate well in order to obtain fruit of the first quality. The culture of small fruits is steadily increasing, as growers can readily see the demand for it in the markets, and there is no reason why it should not be made a pleasant and profitable business.

HORTICULTURE IN THE MINN. FARMERS' INSTITUTES.

CLARECE WEDGE, ALBERT LEA.

Having spent some weeks with the institute as instructor in horticulture, it may interest the readers of our magazine to know something of the state of our art as it appears among the farmers who are attending this traveling school of agriculture.

In the first place we would observe that there is a very general feeling of increased confidence in our tree fruits. Orchards of both apple and plum have been so reliable in their returns for several years past, that even those who have for years been singing the old song that "It don't pay to grow apples in Minnesota" have been forced to find different words for their doleful tune. Plums especially are coming into general notice as a valuable fruit, and one that is entirely at home in our soil. There seems to be little danger that our nurseries will grow too large a stock of our standard hardy Western varieties. The severe drouths of the past few seasons have discouraged a good many in their efforts to grow small fruits for home use, and the market gardeners are of little better heart. The red raspberry of the type of the Turner seems to be affording the most reliable supply of small fruit, aside from the old reliable currant and gooseberry.

In this, the southern part of our state, our leading topics are: "The Farm Orchard," "Windbreaks and Ornamental Planting" and "The Farmers' Plum Grove." We do not fail to present our society as the best source of information in all matters that pertain to fruit raising and home ornament, and advise that they economize even on their nursery bills and become posted on the best methods of caring for the stock they buy. We are endeavoring to impress upon our people the need of using business principles in selecting their nursery stock, and of reasonable care and attention in planting, protecting and caring for it. The varieties recommended by our society are the only ones that are mentioned from the platform, and the tendency to plant novelties is always deprecated.

Superintendent Gregg is very reasonable in the allowance of time given our subject. It is not his policy to force anything upon our audiences, unless they show some interest and are inclined to respond. The writer does not feel satisfied with his own success in stirring up our people as they should be on the matter of making the surroundings of our Minnesota homes attractive to ourselves and a refining influence and pleasant memory for our children. We feel certain that if we can find a man or woman among our horticulturists who combines a good practical knowledge of his subject with entertaining platform ability he will be accorded the most prominent place at the institute.

COST OF PUMPING WATER.

GEO. LE VESCONTE, IRRIGATING ENGINEER, MINNEAPOLIS.

In making an estimate of the cost of lifting water for irrigating purposes, it is first necessary to decide what type of pumping apparatus is best adapted to our conditions. For small quantities of water, forced against heavy pressures, the direct acting steam pump is most generally used. These pumps will consume about twenty-five pounds of soft coal per horse-power per hour. That is, for every 33,000 pounds of water delivered against a pressure due to one foot head, or for every 330 pounds delivered against a pressure due to one hundred feet head in one minute, twenty-five pounds of coal will be burnt in one hour.

For large quantities of water and low lifts, all hydraulic engineers agree that the centrifugal pump, driven by a steam engine, is about the best and cheapest method of pumping. These pumps will raise water on a coal consumption of from three to eight pounds of coal per horse-power per hour, according to the type of engine used to drive them.

There are, of course, many other kinds of apparatus in use, such, for instance, as the various kinds of plunger pumps, steam syphons, injectors, steam vacuum pumps, etc. These latter have their advantage of first cost being light, and they deliver the water more or less warm, but the cost of operation is considerable, the vacuum pumps using about sixty-five pounds of coal, while steam syphons and injectors will consume as much as one hundred pounds of coal per horse-power per hour. If gasoline engines be used to drive centrifugal pumps about one pint of gasoline per horse-power per hour will be used. In most climates, and especially on market gardens, about twelve inches of water per year is considered the right quantity to use. Now, if we use that amount and lift it, say twenty feet, it will take about thirty-five horse-power hours at a fuel consumption, if a centrifugal pump and steam engine be used, of not to exceed eight pounds of coal per horse-power, or 270 pounds of coal per acre. This amount of coal, at $6 per ton, will cost eighty-one cents, so the annual expense of irrigating one acre of land, exclusive of labor should not exceed eighty cents for a twenty foot lift, and higher lifts will be in proportion.

PLUM CULTURE FOR MINNESOTA.

O. M. LORD, MINNESOTA CITY.

In our city markets, no fruit is more eagerly sought in its season than our best native plums; though the market is generally supplied with inferior kinds, the better varieties will invariably find a quicker and more remunerative sale. The poorer kinds are such as have not been grown by systematic cultivation, nor is any special pains taken to place them on the market in attractive form or in good condition, and though they must be immediately sold, the dealer buys them at such prices, as to seldom meet with any loss.

The peculiar quality or character of the common wild plum is too well known to need elaborate description. The skin is thick, tough and acrid, the size is small, and though the juice and pulp may be quite sweet, the bitter and acrid properties about the pit make them unpalatable, especially for cooking. Some of the varieties that have been brought under cultivation, while having the same general appearance, are entirely different in quality. The size is increased, the skin is thin and not acrid, the pit small and free from acid and the pulp thick, firm and sweet.

The trees are not naturally long lived in their wild state nor under cultivation, but no fruit trees bear more abundantly, nor are the apple, the peach, the pear or the domestic plum any more reliable for fruiting. The trees have also been charged with great liability to insect depredations and non-bearing habits from the occuring of pods instead of fruit. In regard to insects: In an experience covering thirty years, I have never seen the vigor nor vitality of the trees, materially injured by insects. Can as much be said of the apple, peach, pear and cherry, to say nothing of blight, sunscald, frost and yellows?

The black knot has formerly been considered a great obstacle in plum culture, but experience has shown that it can be effectually controlled by persistent cutting out. It is true that the fruit is sometimes injured and destroyed by curculio and by the black rot; but under proper care the plum is no more liable to be injured by curculio than is the apple by gouger or codling moth, or other fruits by numerous insects; nor is it any more liable to be affected by rot than the peach or the grape, yet we manage to have a fair supply of all these fruits.

In regard to plum pods: A full discussion of the subject may not be profitable, as it has been quite exhaustively treated in the Cornell Bulletin and also in the "MinnesotaHorticulturist." Some of the conclusions do not accord with my experience. No remedy for the difficulty is suggested, except to destroy the fungous growth. The truth is, in my opinion, no remedy ever will be discovered, as the difficulty is climatic. It cannot be classed as a contagious disease, unless the spores are able to transmit it, and this has not been shown. The mycelium forming the pods may be made to grow in the proper vehicle, but all attempts so far have failed to infect healthy tissues. A distinguished chemist says, "Whenever any plant cells are injured or ruptured, the sap, on coming in contact with the

air or with the injured cells, is entirely changed in its composition from original sap, like the gum of the peach or cherry trees, or like the mycelium of plum pods or other plants. The natural cell protoplasm of plants when brought to the air absorbs oxygen, and this combines with various compounds of the protoplasm forming new unions containing starch, glucose and other carbonates. Nitrogen is also absorbed, organizing nitrogenous compounds, known as the active principles of life. Where they are sporadic, they are easily cultivated in other vehicles adapted to their life. In some cases these compounds assume mycelial forms which may be made to grow, though not strictly sporadic." The peculiar mycelium of plum pods may sometimes be found in the small twigs and branches of the trees and may in extreme cases be carried over the season in the tree and permeate the fruit the next year; but if the season be favorable, this will only be observed to a very slight extent. A row of twenty cherry trees a few years ago produced a large crop of pods, while other trees close by blooming a little later had no pods. Those same trees have produced fine crops since then without a single pod. From the observation of this habit for twenty years, I infer that if the season be favorable no fear need be entertained of the occurrence of plum pods.

The fungous growth is not a disease of the tree but the *result* of injury to the tender tissues of the plant at a particular stage of its growth by excessive cold.

I wish I could speak as confidently of the plum rot. This is a sporadic disease of the fruit; and if the spores fall upon moist fruit or fall upon plums that are in contact, they will multiply, penetrate and spoil the fruit. I received a tree from Mr. Taylor, of Forestville, several years ago, that for three or four years had its fruit rot. It was top-grafted with Desota, which does not rot, though the fruit on some of the original branches continued to be affected. I believe the rot to be more disastrous in a wet season than in a dry one, and that some varieties are much more susceptible than others. I have never seen any rot upon some varieties. As a remedy I can only suggest a resort to spraying with some of the copper compounds or to pick and destroy the infected fruit as soon as discovered. The non-bearing habit has also been attributed to imperfect pollenizing, and the remedy suggested is planting different varieties near together and using some kinds known to be prepotent and furnishing abundant pollen. This has been found to be beneficial in many cases, but nearly all the native plums bear more or less imperfect blossoms every year; and in some years all the blossoms of a tree may have no pistils and, of course, be abortive. Whether this is the natural habit of the tree or whether the plum tree is functionally, if not strictly, dioceous, has not been determined. With our present knowledge, *want of pollenation* is as good a reason for non-bearing as fungus disease is for pods or heart failure and want of breath is for dissolution. I have now named all the serious obstacles to successful native plum culture, and in spite of them have personally had more or less fruit for the last thirty years and, usually,a surplus for market. Mr. C. L. Smith

asserts very confidently that what "Man has done, man may do." I dont know where he gets his authority, but I am inclined to believe it in regard to plum growing. If there are other obstacles to success, they are only such as would appeal to the common sense of any ordinary fruit grower.

If I should transplant a colored gentleman to the arctic circle, I should expect him to sigh for the temperature of Africa. If Chickasaw plums are planted in Minnesota they will freeze to death sooner or later; so also will any of the tender varieties of Europe; but if the Cheney, Rollingstone, Desota or Weaver be planted here, in any soil or situation that will produce a good crop of grain, thrifty and vigorous trees and an abundance of fruit may be assured; and this may be true of numerous other varieties, notwithstanding all the ravages of curculio, insects, plum pods, cold weather, black knot, rot, &c. My faith is such that I shall continue to plant seeds and trees, confidently expecting to gather the fruit. And a strong *hint*, through the work of the Jewell Nursery Co., may be utilized by the tree growers and fruit men of this state, when they are informed that the company has this fall planted upwards of fifty bushels of seeds, in addition to their large stock, from which they may reasonably expect a million trees.

CHERRIES IN MINNESOTA.

AUGUST MEIER, NEW ULM.

My experience in cherry culture began about fourteen years ago, at which time I purchased two trees from an Ohio nursery. I will not attempt to name them, but the fruit is of the same kind as that shipped here from the Eastern states.

I attribute my success with these two trees to the place in which I planted them, which is about fifteen feet from the north side of my house; besides the house there are several large cottonwood trees which also help to screen them from the sun. The trees are now about twenty feet high with stems of about six inches in diameter. The first crop they bore was in 1886. Since then they have borne quite regularly, except in 1893, this section having been visited by a severe hailstorm the previous year, from which they did not recover until this year. In 1892 I gathered about three bushels of fruit from the trees.

They blossom with or a little earlier than the plum or apple trees, while the fruit matures about the first week in July. The berry is of a red color when ripe and has a very fine flavor, and in size is equal to those grown in the East. Many small trees have come up from the seeds or roots underneath the trees; they are apparently of the same kind as the parent trees. I have transplanted some of them, but none of them have borne fruit, so I cannot tell whether they are the same as the original trees.

I have also another kind which seems to be hardier, though it has not so fine a fruit, and they do not produce so abundantly, which is probably due to the fact that the berries grow singly on the

branches—by this I mean they do not grow in clusters as the others do. These trees somewhat resemble the wild or choke cherry, though the bark is darker, as is also the leaf a darker geeen. The fruit, when ripe, is black or very dark red and is somewhat smaller than the other kind; it is quite sour, though it can be eaten, and it makes fine sauce and preserves. This variety seems to be perfectly adapted to this climate, as the trees stand in a place where they are sheltered from the north but not from the south, and they do not seem to suffer from the heat or frost.

Judging from my past experience I would advise those who intend to begin the cherry culture to be very careful in both the selection of trees, to get the hardiest kinds, and the situation. Unless one chooses the hardy varieties which are adapted to this climate a secluded position on the north side of a slope or in the shelter of buildings or trees is the proper place to select. The trees are not hard to start, and with proper care in the beginning and an occasional mulching as the trees grow larger, there is no reason why every table should not be supplied with this,the most delicious fruit that can be raised in this section.

LETTER FROM SECRETARY COWLES, SOUTH DAKOTA STATE HORTICULTURAL SOCIETY.

A. W. Latham:

Dear Friend:—Your kind favor with the program of your meeting received. I can hardly give up the hope of attending, but times are too hard. We thank you for the fraternity shown us by sending Mr. Terry to our meeting; his presence and help were appreciated, I assure you. The last year has been a very trying one in our state for the horticulturist, most of the fruit being either killed by the May frost or by the drought of summer. Trees died here this summer the worst we ever saw, even large trees dieing. The tops of the oldest trees set here were killed, cottonwood, maple and even box elder, six to eighteen inches in diameter. Personally, it is the best apple year in the last five; we sold about $300 worth of apples, besides plums and currants. Small fruits were a failure. We are looking forward to better times—the dry weather cannot last always. Wishing you success in your meeting and work I remain yours,

E. D. COWLES,

Secretary State Horticultural Society, South Dakota.

Vermillion, S. D., Jan. 7, 1895.

THE MINNESOTA
HORTICULTURIST.

VOL. 23 MARCH, 1895. NO. 2.

Irrigation.

POSSIBILITIES OF IRRIGATION IN MINNESOTA.

D. R. M'GINNIS, SEC'Y COMMERCIAL CLUB, ST. PAUL.

Before beginning my subject, I want to express the pleasure which I feel at seeing the faces of so many of my old friends whom I met with when I attended the meetings of the Horticultural Society in 1885 and 1886, and I am very happy to meet with you again. I have read your reports, but it has not been my privilege to meet with you again until this time. I feel that possibly I have something to say to you of interest this morning. For the past seven or eight years my business has taken me to the semi-arid and desert regions of the United States, comprising almost fifty per cent. of the number of square miles in the United States. My experience and observation in a desert where there was a rainfall of only seven inches a year brought to my mind the possibilities of irrigation and the profits of irrigation if applied in our own state. I have been impressed, if I may be permitted to say so, by the remarkable lack of knowledge on this subject in the portion of the United States where they usually have rainfall sufficient to mature crops without irrigation. At a rough estimate seventy-five per cent. of the crops of the world are raised by irrigation, the remaining twenty-five per cent. by relying on the rainfall. It happens we live in a country where the rainfall is sufficient to raise crops some years. To all intents and purposes we lived in a desert last year.

What I want to speak to you about this morning is the practical application of irrigation to our conditions here. Irrigation means absolute certainty in raising crops. Suppose you could raise the largest crop possible every year, and the first in quality. There is not a man looking at me in this room, but has lost, if he is in the agricultural business, heavily from drouth. Think of it, friends. Am I right or not? But, irrigation, like anything else requires some knowledge to apply it and get its best benefits. There can be short crops with irrigation as well as where rainfall is relied upon; but it is not an abstruse or difficult thing to do, if certain principles are followed. My observation and experience in irrigation is that when you irrigate, the way to irrigate every time you wish to irrigate is to cultivate instead. Now, I mean that

in a tentative sense, of course. In this desert I referred to in one particular case we raised eight hundred bushels of potatoes to the acre. I want to show to you that it is the most enticing thing in the world to see the water run down the irrigating furrows; that the farmer who irrigates is constantly enticed to the point of letting the water do the work, and instead of using the plow or the cultivator he turns the water down the rows and thinks that will raise his crops. Don't you do it.

I am impressed by the fact of the small amount of water it takes to irrigate, even in desert regions where irrigation is absolutely essential. When I came here last summer during the drouth I had just come from a climate where there was but five per cent. of water in the air, while here at the dryest time it had from twenty to eighty per cent. of moisture. Now, irrigation should only be applied to plants when they absolutely need it. For instance, in raising potatoes do not turn the water on as long as they are growing; let them wilt to show the need of it. I will insist that the thing to do before planting is to saturate the land. Get as much water on as you can. Aim to get the water in the ground first, then plow the ground and plant your crop. If it is potatoes, the moment the first sprouts appear above ground take the harrow and run it crosswise of the ground and tear up all the potatoes you can. It will, perhaps, pull up a few young potatoes, but that does not matter. As soon as you see the rows plainly cultivate very carefully and as deep as you can; I am not an advocate of shallow cultivation, unless it be under certain circumstances. Within a week afterwards, when the ordinary irrigator would put his water on the potato crop, don't you put any water on; cultivate again very carefully and harrow it crosswise of the row. Your neighbors will tell you your crop is ruined, but it will not be so. After about one month is past, with a weekly careful cultivation, then take your plow and open out your rows, turn the water in at the head of those rows, but be very particular not to let the water touch the plant or they will scald. Open the furrow and turn the water in at the top of the furrow. I will tell you in time how to get that water distributed. Let it run till it reaches the end of the row, and let it saturate the land thoroughly.

Now, the mistake my neighbors made was in trying to make the water raise the crop. As I said before, irrigation is the most enticing thing in the world. Then do not wait until the sun begins to bake the ground, but as soon as you turn the water off cultivate very thoroughly. I raised the past year 800 bushels of potatoes to the acre, while my neighbors raised from 60 to 150, because they tried to make the water raise the crop. How do you get the water on the land? It is a difficult thing to irrigate in Minnesota. Irrigation is the most profitable when you can lead the water over the land by force of gravity. That cannot be done except in a few cases in Minnesota, from the fact that there is not sufficient fall to your streams, and they do not maintain the same stage of water at all times. They may be flooded early in the spring, and they may be practically dry the balance of the year, and especially so in the

season when you need to irrigate most, in July and August when evaporation is greatest; but there is one way by which you can overcome this difficulty. It is possible to confine these waters of the early spring at the headwaters of our streams, as is being done now. The government calls it "inland navigation;" I call it spending money to float logs to the mills. Now, I have said that as a rule irrigation pays where you can let the water flow on the land by gravitation. Irrigation by pumping will pay only where you can raise certain concentrated crop products. Small fruits, like strawberries, are instances of that class. Strawberries particularly require plenty of water, and they produce a large amount of money value per acre. There is not one year, there is not a single year, but that you could greatly increase the small fruit crop by irrigation. The fruit needs to be plumped out by moisture, and it needs moisture to ripen it properly. If you have control of a water supply, even of a small amount of water, such as by means of tanks, you can do a good deal in the way of irrigating your small fruit. It will be money in your pocket. A thirty barrel tank is worthless to irrigate with. You should have a 150 barrel tank, to 250, 500 or 1000 barrel tank, and larger, and then keep those tanks full. Never apply the water cold to your crop. Put in wind engines, raise the water to those tanks, keep the water there until it acquires a temperature of 60° to 70°. Do not flood your strawberry beds or other crops you may raise; store your water, and then when you see that your strawberries or other small fruits need water, make those small furrows I have spoken of and get your water in the land as soon as you can. You cannot irrigate level land, but I have seen land irrigated where it was so steep you could not drive a wagon across it. Get the water across your land as soon as you can, and if you have any fall to your land the water will soon run across it; as soon as it gets across cultivate, and cultivate deep, even in sandy soil; harrow it up good so it will not pack, and you will get remarkable results.

In regard to getting the water to your small fruit crop (a small patch of ground is what I am speaking about now), take an eight-inch board for the bottom and six-inch board for the sides, and make a trough; put that across the upper side of the land to be irrigated; take a 1¼-inch auger and bore holes in the side of the trough opposite every furrow, and the water will spout through the holes; that is irrigation on a small scale. I have a twenty-acre field irrigated in that way the entire length of the field. All I had to do was to go out there and pull up the gate and the water would find its way out; it found its way through the rows, and I knew there was no failure in that. I have heard of several people who are irrigating by steam power. It nearly always costs more than it is worth. You might possibly be able to irrigate your potato patch by means of a threshing machine engine where you have the money already invested and where you have your own wood supply. It might possibly be be profitable to do that where the expense is very low. If you use coal or wood at $2.50 per cord, it would be extremely difficult to make any money irrigating, except in exceptional cases, with steam power. You could irrigate small fruit with windmill power.

This is a very large subject, and it is something I cannot hope to impress upon your minds—what irrigation is—until you have experience with it yourselves. Irrigation will make its way with you, but I do not think that people who have even a scanty rainfall will appreciate what irrigation is until they are made to. I thank you for your attention. (Applause.)

DISCUSSION.

Mr. Elliot: There is one question I would like to ask Mr. McGinnis. He states that he cultivates immediately after he irrigates. Do you give the soil time to partially dry before cultivation?

Mr. McGinnis: We can open up a great many sides of the question depending on the kind of soil. If you have a soil without sand, it will pack if you plow it wet, and you can do nothing with it.

Prest. Underwood: Just come up here Mr. McGinnis and take a chair; we are going to pump you. This is an important subject, the most important we have had, and we must find out all we can about it.

Mr. McGinnis: As to the soil that can be irrigated: I would not recommend any one to irrigate soil that has not a portion of sand in it. For irrigation the pure sand is the best land; it makes no difference if it is thin. The objection to irrigation is this: The rain drops fall here and there, and the rain does not appear to have that packing quality which water has when put in a body on the land, and I only recommend irrigation on your black sandy loams and your more sandy soils. On heavy loam without sand in it I do not think it would succeed very well. A desert soil has never had the decaying vegetation, the humus. A desert soil is like ashes; you can kick it up like an ash bed. Our soils here are made of decayed vegetation, and such soils are not in the best condition to withstand baking. When you set out your small fruit select some sandy soil with considerable slope to it.

Mr. Barrett: Would you consider irrigation adapted to prarie soil ?

Mr. McGinnis: The prairie soil has considerable sand in it, except the Red River Valley. Yes, sir.

Prof. Hays: What is your experience with cold water ?

Mr. McGinnis; The water should be at a temperature of 60° to 70°. Do not make the mistake of applying ice cold water to your crops.

Prof. Green: Suppose there is a high point; what is the cheapest way of making a reservoir on that land ?

Mr. McGinnis: That is a simple question to answer. Just take a scraper, and your hired man and team and throw a dam across the river or ravine. It will take very little water, comparatively, in this climate, yet at the same time it will do your crops an immense amount of good. Just throw an embankment across a stream or ravine, and do it cheaply. Yourself, your team and hired man can do it at odd times, when nothing else is pressing, and if you throw up an embankment across a ravine where the temporary snow water in the spring can collect, I will guarantee that if you use that water wisely a year, it will be the best investment you ever made.

Mr. Pearce: Now I am going to say a word on irrigation. I agree with you that it is a good thing. Out north of me, there is a man whose land runs down to the lake, and forty rods away south of that I am, with an elevation of thirty feet above the lake. We have looked the matter carefully over. We are going to have water; we have engines, we have two engines there which are doing nothing during the summer. We propose to put an engine there that will throw a barrel of water a minute. Our land is in a position so we can irrigate. Now the cost of running that engine is the way to figure it, and a barrel a minute is not to cost us more than two or three dollars a day. Now, what I want to know is, can we make a success of it?

Mr. McGinnis: If you go out of the domain of gravity and enter the domain of wind pumps and engines, it depends altogether upon local conditions. If you can hire a man for twenty dollars a month, you can irrigate for a short time, but when you make up your mind to irrigate for a long time, you must get the expense of raising that water to the lowest possible point, or it will result in financial failure.

Mr. Pearce: We are going to use pipes.

Mr. McGinnis: It is not necessary for you to use pipes; use lumber, it is cheaper. You will find lumber cheaper and easier to handle.

Mr. Elliot: Sixty barrels an hour would give him 1440 barrels in twenty-four hours; that would cost him about five cents a barrel. He could do considerable with that amount of water.

Mr. McGinnis: I want to caution you. While I am very enthusiastic about irrigation, it is an experimental matter with you, and I do not want to be in a measure responsible in claiming too much for irrigation.

A voice: I have a well that throws fifty barrels of water an hour, and I can only irrigate three acres.

Mr. McGinnis: Is it level?

A voice: Yes.

Mr. McGinnis: Well, that accounts for it. You cannot irrigate level land.

Mr. Tobey (Wisconsin): I understand you to say it is not practicable to irrigate level land in Minnesota?

Mr. McGinnis: To irrigate you must get the water in motion. It has got to have a fall to get a move on it.

Mr. Jaques: In my part of the country if you put fifty buckets of water on the ground it sinks right out of sight.

Mr. McGinnis: That is the kind of land to irrigate with most success.

Mr. Gould: I have been very much interested in Mr. McGinnis' talk on irrigation. I want to ask him if the twenty acres he mentioned as under irrigation are in this state?

Mr. McGinnis: No, it is in a pure desert.

Mr. Hitchcock: I want to correct one statement my friend made. You want to have your land just as level as possible. You must have it level.

Mr. McGinnis: Yes, in this sense, that the slope must be level. The more slope you get the better; it must have a slope to it, but an even slope.

Mr. Gould: What kind of crops do you raise?

Mr. Hitchcock: Vegetables, cabbage, celery, etc.

Mr. Gould: How do you irrigate?

Mr. Hitchcock: Let the water run down the rows.

Mr. McGinnis: I still hold to my first opinion, that land must not be level, because you must have a slope in order that the water may run through the furrow.

Mr. Hitchcock: I have a patch of strawberries set out last spring, and we could not water them at all—there was too much slope.

Mr. McGinnis: I do not mean by that that the land should have a hundred feet of fall, but I have seen land successfully irrigated that was very steep.

Dr. Frisselle: How do you apply water by means of a hose on a small patch of land?

Mr. McGinnis: In California, where land is very valuable, they have their trees in the midst of a depression, and they water them by means of a hose. It will not do much good to apply the water with a sprinkler.

Dr. Frisselle: You spoke some time ago about putting water directly on the plants. What would you do with a good shower?

Mr. McGinnis: A shower comes in single drops, while in irrigation the water is applied in a body.

Mr. Gould: I consider that Mr. McGinnis has made some very candid statements of great value to us, and it is a good thing to have this matter under discussion in our society. This thing is pretty broad, and one man cannot know it all. He may have had experience, but it may not have covered all conditions. Now, the first thing I speak of to criticize the statements of the gentleman is that he discouraged the idea of irrigation on clay land; he stated that distinctly. Now, I came to the conclusion a good many years ago that the fact was worth a great deal more than the theory. I happen to know a fact in connection with this subject that would be proper to mention here. Last year was the dryest year and the toughest one on small fruits, including strawberries, raspberries, etc., I have ever known, and I have been in the business almost thirty years. One man had a half acre of strawberries close to a swamp; it was right up by the side of the road about a quarter of a mile from where I live. This man put water on his strawberry plants at night. Part of the time he hired a man with two horses to haul the water, when he could haul several barrels at a time, and sometimes he used only one horse. He got his water right at the end of the rows. He used pails to dip up this water with. He hauled this water every night, and they threw it on the plants with pails; it was rather a bungling manner of doing it, but they went over all those rows of strawberries and they got there all the same, and that man sold from that half acre of strawberries 1800 quarts, and that was on a clay soil, and that is just the average sort of soil in our region.

Mr. Clark: Mr. McGinnis says before planting he would saturate the soil. I would like to ask him if he would do that in the spring or in the fall?

Mr. McGinnis: It is better done in the fall, but it will do in the spring. The deeper you get that moisture in the soil the better the capillary attraction. Referring to what the previous gentleman has said, I want to make this specific statement: I do not doubt but what if the water is simply sprinkled on the plants it will do no harm, but the rule in irrigating is not to permit the moisture to touch the plant—let it reach the root of the plant only. I could sprinkle a bed of strawberries in the evening, and the moisture would distribute itself during the night—but I still say, do not let the water touch the plants.

PUMP IRRIGATION.

PROF. W. M. HAYS, ST. ANTHONY PARK.

I thought of writing a paper, but I saw the papers ahead of me on the program, and I concluded I had better speak about what might be left when the others got through.

I want to say, in the first place, a few words in regard to the sources of supply of water with which it is possible to irrigate by means of pumping machinery in Minnesota. That supply is larger than most people think. The possibilities of pump irrigation in Minnesota are indeed very great, and the machine men are going to take hold of this question of pumps, to study how best to use machinery and what kind of machinery to use. I believe as the years go by there will be a large development in this direction. If we should have a dry year next year we should have a great boom for irrigation, but if a wet year, interest in this subject would wane. Occasional years we do not need to irrigate, and only occasional years do we need to irrigate as our friend of Sparta did, using ten thousand barrels of water on three and one-half acres each week or two. Most years we need to irrigate a little. It is rare that Minnesota needs as much irrigation as last year. There will be more conditions where irrigation will pay, as we plant more of those crops that grow an immense amount of money value per acre.

I want to call your attention to the fact that in Minnesota we have an immense number of lakes, which have water that is always warm. We have a good many rivers and small streams that are carrying large amounts of water. We have in many places, also, an underground supply of water that is within a reasonable distance of the surface, and we have within easy reach of all this water an immense amount of land; no need to go on a high hill or high ground. If you are going to try to do something with pump irrigation go down near the water, so you do not have to raise the water very high. You will often find low land where irrigation pays better than on tops of high hills. There are still other sources of supply we can draw from. The flood waters from the snow and rain in the spring we might dam up, as was mentioned by one of the gentlemen here. There are many places where there are long ravines at the lower end of which we can store water with a small dam, if the soil is of such a nature that the water will stay there during the early part of the summer.

As regards this matter of the amount of water it requires to irrigate an acre, an inch of water, or a thousand barrels, per acre are required, and that is a good deal to get in a dry time. It will do more good in a dry time than when we have nearly enough rain. It will go further in a dry time on a heavy soil than on a light soil. Where this gentleman irrigated with his artesian well he used ten thousand barrels of water to irrigate three and a half acres, which indicates from one to ten inches of water; but remember this fact, he had a soil in which the water percolated through the soil, and it is a question if he did not use more water than paid. If he had had ten acres he might have realized more money than he did from the water he used on his three and a half acres.

Mr. McGinnis gave us very excellent ideas, and we are indebted to him for bringing us the encouragement that comes from irrigation in the West. I wish we could go out there and study the question; but he looks at this matter of the amount of water required from the standpoint where they have plenty of it, and we have to look at it from the standpoint where we have to store water. While their atmosphere is dryer and they have a sandy soil, we have conditions just the opposite, and a comparatively small amount of water will do us much good—and that brings us back again to this question of machinery. Considering all the facts, that we have many lakes, rivers and other sources of water, it might pay better to give a good price for land to a neighbor for lower land than to go on a high hill and invest money in costly machinery to take your water up there. It takes some experience. Where you have deep wells, the only thing you can use is a steam pump where the steam acts directly on the piston which carries the pump. At the experiment station we have a well 280 feet deep, with water which comes to within a hundred feet of the surface, and the tank is one hundred feet above the well. The tank is twenty feet deep. I will not say anything about the cost of the plant, because the plant is used for general purposes at the station, but just counting the cost of labor and fuel, we can put the water in that tank for one-half cent per barrel, which would amount to about five dollars per acre. That is why raising the water is too expensive, and, if we count in the cost of the plant it would raise the cost far more than the figure I have given.

For putting one inch of water on an acre, for a short raise of water there are several kinds of pumps run with power. There is really no cheap arrangement for running a pump directly with gasoline, or anything of that kind, but there are a number of arrangements for running pumps by means of an engine and belt. One consists of a rotary pump which is simply an arrangement for forcing water forward. The most commonly recommended pump is the centrifugal pump, and I have had a gentleman who is doing some work in putting in irrigation plants make an estimate. He named a man living near Minneapolis who had a threshing machine engine we could use. We said nothing about the cost of the engine, but we would have to allow him something for the use of it. He could purchase a centrifugal pump, with 3-inch opening, that would raise the water thirty feet, for less than a hundred dollars; he could purchase 400 feet of 4-inch pipe for $108; his fittings, valves, etc., would cost $25 more. He would have a weight of less than 3,000 lbs. that could be hauled from place to place, and it might be possible for him to take in jobs of irrigating land. Certainly, it would not be very difficult with 4-inch pipe to move the whole thing from one place to another. This is a suggestion, of course. The pipe for carrying the water can be purchased, say 1-inch at 3½ cents; 2-inch, 10 cents; 3-inch, 19 cents and 4-inch, 27 cents; that is about the price pipe can be bought for. Probably, a 4-inch centrifugal pump would be as large as could be used with an ordinary threshing machine engine. Where does the cost come in besides the plant? It is the fuel and the labor. In many gardens and fields in the state the water would need to be raised more than ten to twenty-five feet. The wood can be purchased

in some parts of the state for $1.25 per cord, laid down in winter. In other parts of the state it would cost much more. I believe that one of the ways to do this thing is by means of centrifugal pumps run by our steam engines. If a man had a large plant he might put in an old saw mill engine, and get it cheap enough to run it for this purpose. If you have to buy the engine, it adds to this expense, as the power is used for such a short time each year. These portable engines could be used, if you put in your pump permanently, and the same engine could be moved from one farm to another.

Gasoline power can be used instead of steam power. The fuel and attention it requires are less expensive than with steam power. In this case you must buy the engine. We use a 22-horse power engine. I believe gasoline engines would be just what we would want if they were to be had at a living price. A 10-horse power engine would probably cost $700 to $800, which seems altogether out of proportion to the cost of making it. It would be possible in a simple way to make a little belt elevator, as I have seen them used, and throw the water in a large trough. For irrigation in a small way some such thing might be put up very cheaply and made to answer the purpose. Hydraulic rams could be used in some places where there is a regular water course.

Mr. Dartt: Can you tell us anything about the hydraulic ram, how it works ?

Prof. Hays: As I remember it, the hydraulic ram put in a stream would raise one-seventh of the water that goes through to five times the height of the fall, so if you have plenty of water in the stream and much fall, you can raise it to a low height. I have never used one, and have never investigated their cost. One of the expenses of irrigation is the power. The rotary, or centrifugal, pump is not a very large expense. Instead of distributing the water with hose it might be well to use a box for distributing the water; that has a greater capacity, and it will carry the water a considerable distance, and by running the water through holes in the box, it will answer the purpose better than a hose. There are a number of things we must consider under our conditions, and one peculiar feature is that only occasionally do we need irrigation. On some lands irrigation is not needed for years. I want to emphasize this fact, the machine side of the question is one of the sides we want to hustle. If we can get the machine men interested in making a lot of experiments this year, I think we will get along pretty rapidly.

Mr. Anderson: I want to give you a little experiment. Year before last we did not get a crop of strawberries, and I thought if we were going to have another season like it, I would water my strawberries. I went down town here and got me a piece

of hose from the fire engine, and attached that to a kerosene barrel, and took three barrels on the wagon, backed my wagon into a pond, filled the barrels and hauled the water to my strawberry bed. One of my boys would drive the team and another would dip the water out of the barrels into the one with the hose attached, while I would guide the stream from the hose on the strawberry bed. The rows are ten rods long, and they averaged a little over a barrel. The first two weeks we watered twice a week, and the third week we watered three times, and this we did in the morning, because I had the boys help me before it was time to go to school. There was one row we put on twice as much water as on any other, and one row we did not water at all. On digging into the soil I found the dirt very moist, while in the row we did not water it was very dry and hard, but I could see no difference between the row that had twice as much water and the other rows that had only half as much. In the row which we did not water at all, we picked quite a few berries, but they were not so large as the others. After the third week we had a good shower and they needed no more watering.

Mr. Clark: I would like to ask Prof. Hays one question. He did not touch upon the use of windmills. Why did he not say anything about it?

Prof. Hays: That has been talked of a good deal, and I tried to cut it short. I might say that from what I have been able to learn the ordinary farm windmill will water from a few rods to a quarter of an acre. A large windmill will water an acre. It will run right down around your well without watering a square rod So the matter of reservoirs or a method of spreading the water is the great question; and, probably, taking into consideration the cost of distributing the water by first putting it into wooden reservoirs, it will be greater than by those other means recommended. In irrigating a small place, especially if the lift is not very high, it may answer the purpose. I was very glad to hear the experience of this gentleman from Wisconsin who used cold water for irrigation. It clears up the point as to whether we must use reservoirs or not to warm the water.

Mr. Gould: I will repeat what I said this forenoon on this question, that this is a pretty large subject to handle, and it cannot be expected that any one man or his theories will settle the whole problem, and I doubt whether we with all our knowledge and experience can do it; but we can do this and

that, and if we put together our experiences and what we know, we can get some good out of it. While windmills are doing a good deal of work in many places, I think that matter is just in its infancy. I call this windmill power better than any other, but I believe it is only partially developed; it is in its infancy. If several mills could be used, several mills put together, and I think that could be done, I believe that is going to let us out, and I believe that will make this matter of irrigation a success. The water at the experiment station has to be lifted two hundred feet and it takes an immense amount of power to do that. One of the largest size steel windmills will raise a large amount of water, perhaps 600 barrels in twenty-four hours. It is possible to do that if you have a good wind exposure. I think we will develop in the end a system of wheels which will act together to do the work, perhaps three or five, or something like that number, and that is the cheapest power on earth when developed.

Prof. Hays: I want to say just one word. The windmills where they have been tried have not generally got along well. People have become discouraged with their windmills. Theoretically it is a cheap power, but they will not do enough work at the right time. We only want to irrigate at the right time, and I am looking for the solution of this question to machinery power, engines.

OUR SEARCH AFTER WATER.

S. D. RICHARDSON, WINNEBAGO CITY.

The past few years have been so dry that at times the nurseryman and others engaged in the culture of small fruits, have had to have more water to insure a good crop than fell from the sky in the course of the summer. The object of the present paper is to give a brief account of the methods we resorted to, to overcome the want of sufficient rainfall. When we settled in Winnebago City in the spring of 1885, there was a piece of land on one side of the field containing a little more than two acres, that was of little practical use. A pond or slough that, when the country was first settled, never went dry, occupied part of it, and the rest was either so dry or rough that it would yield but little hay.

We dug an open ditch, run off the surface water, sowed some clover seed and for several years used it to pasture a cow. But the open ditch was a nuisance and so was a grass patch in a plowed field; so we broke it up, put in some seventy rods of tile, and now it is the most valuable land we have. The bed of the slough, some thirteen rods in diameter, neither gets too wet nor too dry. We had four rows of strawberries through the center of the piece the past summer, and while those on the dry land were nearly a failure,

those on the slough bed bore a heavy crop and did not seem to know that we were having a hot, dry summer. We set about an acre of the piece to strawberries, last spring, and we have enough more plants than we would have grown on ordinary dry ground to pay for the expense of tiling the whole piece.

When I went to the state fair last September, I saw many acres in the Minnesota valley that now answer no other purpose than to hold the world together, that might be easily drained and made the most valuable land in the valley. Where such land can be obtained, using it is the easiest and cheapest way to solve the irrigation question; but by all means put in tile—the open ditch is an abomination. Any one that has what the Yankees call "gumption" can lay tile by having some one who knows tell him how.

We have a windmill and elevated tank, 300 feet of three-fourth inch iron pipe and 150 feet of hose, and can reach four or more acres of land, and find the water pays for itself each year. We use it in transplanting, getting strawberry runners to root, etc.; but it does not yield water enough for a growing crop. We watered some peas last summer—rows five or six rods long. They were planted in double rows sixteen inches apart and three feet between the rows. We took a Warren hoe, made a shallow ditch between the double row, put the hose at the upper end, turned on the water, and it took some thirty barrels before it would fill the trench at the lower end. Where any one has a well and tank it might pay to put in pipe and hose, keep the mill pumping all the time and use the extra water for irrigation, but I could not advise any one to put in a plant just for the purpose of irrigation unless there was abundance of water near the surface.

IRRIGATING SMALL FRUIT WITH AN ARTESIAN WELL.

ELMER R. WOLCOTT, SPARTA, WIS.

I have about three and a half acres of blackberries, raspberries and strawberries on rather sandy soil. In 1893, my berries were nearly a failure on account of the dry weather, so I decided to put down an artesian well to irrigate with. I put down a four-inch well in the center of the berry patch, 280 feet deep, the water rising about ten feet above ground, and throwing about 150 barrels per hour. The well cost, including all pipe and hose and a pipe into the house and one out to the barn, about $275.00. It being the last of July when the well was finished, it was too late to irrigate much, but in 1894, I began irrigating the last of May, and with the exception of five or six days irrigated for three months, the weather during this time being very hot and dry, with no rain. I use 225 feet of two-inch iron pipe, which I attach to the well, and lay on top of the ground out into the berries. Then I put on seventy-five feet of two-inch hose on the end of the pipe, and then soak up the ground as far as the hose will reach on each side of the pipe; and by taking off two or three lengths of pipe at a time, gradually work back to the well, and then take up the pipe and lay it in another direction, until the piece is all gone over. It generally took me about seven days to irrigate the three and one-half acres.

It takes one man most of the time to move the hose around, and steer the water around with a hoe. The berries were cultivated often, being irrigated each time.

The hot winds were so severe last summer, that the ground was dried out and ready for another soaking at the end of each week. But the same amount of water would irrigate twice the amount of land on heavy soil.

The result was that I had some very nice berries. The last berries that were picked were as large and juicy as the first ones, and every berry developed, and the vines for next year are in excellent condition; while berries across the road from mine were not picked, the berries were dried up, and next year's vines look very sick. Heavy frosts the first of June killed one-half the crop. I sold about $500 worth of berries; I don't think I would have sold $50 worth if I had not irrigated. The water from this well was very cold, but it did not seem to hurt the vines any.

DISCUSSION.

Mr. Phillips (Wisconsin): How many more berries did you get than your neighbors on account of irrigation?

Mr. Wolcott: My neighbors did not pick any berries at all. If I had not irrigated I would not have picked any berries either. I got $450 worth more than if I had not irrigated.

Mr. Phillips: What about irrigating that three-quarters of an acre of strawberries you told me about this afternoon?

Mr. Wolcott: I have half an acre of strawberries, perhaps less. The year before my strawberries all dried up—I did not have any last year. The past season I turned the water in on the strawberries, and I dammed the rows up every two rods, so the water could soak clear down to the roots; it was so soft I stepped into the mud three or four inches. I sold three or four thousand quarts of strawberries. I put in about a day or a day and a half irrigating this strawberry patch, and the well flows 150 barrels an hour I kept right on soaking it

Mr. Phillips: You said you turned the water on three days and nights after you picked?

Mr. Wolcott: After the vines were picked I turned the water on two or three days, and my vines were in nice condition for next year.

Mr. Brackett: Is it a self-flowing well?

Mr. Wolcott: It does not run unless I turn it loose. It flows about 150 barrels an hour.

Mr. Wedge: Did you run it day and night?

Mr. Wolcott: During the hottest part of the year I ran it nights. I ran it about ten hours on an average.

Mr. Kellogg (Wisconsin): How did it affect the shipping qualities of the berries?

Mr. Wolcott: I shipped to Aberdeen, Dakota, and they wanted more of them. For blackberries, people came to the house and I sold them right off the place as fast as I could pick them. I thought at first I would use enough eave troughs made of fence boards, raised about ten feet above the ground at the well, but I found there was not fall enough, so I got the two inch iron pipe which is much better.

Prof. Hays: What is the size of your well?

Mr. Wolcott: It is a four inch well. I think the well paid for itself last year.

Mr. Gould: When you speak of berries, do you mean all your berries you raised?

Mr. Wolcott: I mean strawberries, raspberries and blackberries.

Mr. Gould: Do you include all that you made on the place in that $500 you mentioned?

Mr. Wolcott: I sold about $500 worth of berries altogether. The frost killed half of them.

Mr. Elliot: You did not have all your ground occupied with vines?

Mr. Wolcott: No, there was considerable breaking.

Mr. Gould: Did the frost kill your blackberries?

Mr. Wolcott: Yes, in June.

Prof. Hays: What kind of soil have you got?

Mr. Wolcott: It is all sandy soil.

Mr. Pearce: What is the quality of the water?

Mr. Wolcott: It is hard water. I do not think there is any lime in it.

Mr. Anderson: When would you rather water, in the night or in the daytime?

Mr. Wolcott: I would rather water in the daytime, if the weather is dry or warm; if you have got to irrigate in warm weather the ground warms the water before it reaches the roots.

Mr. Pearce: Do you think if the water had been warmed the crop would have been larger?

Mr. Wolcott: I do not think it would have made any difference. I ran my lawn sprinkler on the edge of the strawberry patch, and the strawberries were just as good at one place as another.

Mr. Wedge: Doesn't the nature of the soil make some difference?

Mr. Wolcott: I think where the ground is sandy the soil is warmer, and cold water is just as good as warm water.

Mr. Pearce: Didn't the water come in contact with the plants?

Mr. Wolcott: No, not directly; I dammed up the rows so the water ran clear into the roots.

Mr. Anderson: Did you run a solid stream or spray?

Mr. Wolcott: I ran the water right through the rows, through an open hose, a two-inch open hose, ran it right through the middle of the rows. Where it was level I did not have to dam it up, but where it was not level I dammed it up a little. For irrigating with a hose I would prefer level ground to ground that slopes. I have berries on one side that slopes considerably, and the water did not soak in well at that point.

Mr. Gould: Did you cultivate continuously?

Mr. Wolcott: I cultivated once a week. I think, perhaps, as some gentleman suggested, it would be better to cultivate oftener, perhaps a day after you irrigate.

Mr. Crandall: How did you prevent the berries from becoming dirty?

Mr. Wolcott: The ground was always wet and there was no dust.

Mr. Tobey, (Wisconsin): You did not cultivate your strawberries?

Mr. Wolcott: No, I do not cultivate strawberries. My strawberries were mulched.

Mr. Hitchcock: What was the object of the dams?

Mr. Wolcott: If I did not dam the water it would run off; it would not soak into the ground.

Mr. Hitchcock: You say you had your strawberries mulched? Did you let the water run over the mulch?

Mr. Wolcott: No, the rows are a little bit higher.

Mr. Hitchcock: My practice is to let the mulch stay where there is much fall; that checks the flow of the water and soaks the ground thoroughly.

Mr. Wolcott: By damming the water a little it answers the same purpose.

Mr. Hitchcock: I had rather have it mulched clear across.

GARDEN IRRIGATION BY RAM AND TANK.

G. H. POND, BLOOMINGTON.

Before commencing upon my subject, I will say that my experience in this line has been on quite a small scale; and, also, that of the many questions that arise, I must answer to the majority of them, "I don't know."

I think I am not making too strong a statement when I say that every gardener and fruit grower in this state will agree that nearly every year there is a time of drouth, when judicious irrigation would be a great benefit. But the question often asked me, and which I suppose will be of the most interest here today is, "Will it pay me to go to the expense of irrigating my garden?"

Now, in considering the subject with a view of answering this question, I will give some of my experience; especially some of the reasons I have found why it may *not* pay to irrigate.

My garden is on the brow of the bluff overlooking the Minnesota river and is quite sandy. Things always grow *finely* in the spring there, but nearly always dry up bodily in mid-summer. Six years ago last August, I got so tired of having my garden dry up, that I put a hydraulic ram in a spring a quarter of a mile away, and brought the water up to a forty-barrel tank, elevated ten feet above the highest ground in the garden, the cost of the entire outfit being about $100. The ram has to raise the water one hundred and ten feet, and it takes one and a half days to fill the tank.

Since then I have watered the garden with varying success, never feeling *sure* I was paid in dollars and cents, until the past summer, when I am certain I got back all I had invested in it.

One-fourth of an acre of strawberries and about one-thirtieth of an acre of tomatoes was all I watered. My receipts from the strawberries were $120 and from the tomatoes $14, making a total of $134, all of which I will have to credit to the water; as it is certain I would have had nothing without it.

Now, where the trouble lies is in applying the water. I have tried holding the hose in the hand, with a spraying nozzle, fastening the nozzle and moving it frequently as we see done on the yards in the city; and, lastly, attaching the hose to a half inch pipe fifty feet long, having leaks punched at intervals of six inches. The pipe is laid on the row to be watered, the leaks being just sufficient to keep the ground soaking wet along the row, and moved about every fifteen minutes.

Any way I have tried requires a good deal of time, the last taking much less than the others, besides using the water more economically. Now the time spent applying the water would never be lost, if we could only know when it is going to rain. Often I have thought it was about to rain and have neglected to water, only to find the clouds vanish away and the strawberries wilting; and on the other hand, I have many times spent considerable part of a day watering, and then at night we have had a good rain, making unwatered gardens fully equal to mine. I will say though, that last summer I was not troubled *that* way.

As to the question "Will it pay to irrigate?" If the summers are all to be like the last, it certainly will. But if we are going to have the rainfall in the future average as it has in the past, I think it doubtful; and would advise any one about to try it, to commence on a small scale at first, and then if it pays to extend it. And just here I want to say that it requires an astonishing amount of water to keep plants thriving in a drouth. On the quarter acre of strawberries watered last summer, I put at least one hundred and forty barrels of water a week, from the middle of May till the last of the berries were ripe, June 25th, and *that* was not near as much as they ought to have had.

And on the tomatoes, fifty-two plants, I put one-third of a barrel of water on each plant, three times a week. Making just a barrel a week for each plant. That was enough, and I never saw tomatoes do better. I picked thirty-one bushels of splendid tomatoes from them, making the yield at the rate of nine hundred bushels per acre. My experience leads me to think that six hundred barrels of water a week, would be needed on each acre of sandy soil during such a drouth as we had last summer. I have heard folks say that no amount of watering would equal a rain, but think it is a mistake, and that if enough water is put on, and it is done in the evening, and kept up, strawberries, tomatoes, and perhaps anything else, will do as well as though they had plenty of rain.

In conclusion, I will say that I have never regretted having gone to the expense of irrigating; the *satisfaction* of being able to keep the garden green in a drouth counting for something, as well as the dollars to be made by it.

IRRIGATING SMALL FRUIT WITH WINDMILL AND TANK.

A. H. BRACKETT, LONG LAKE.

I was asked by our secretary to write a short paper on the above subject, as that was the method I pursued in the transmission of water to my fruit this past season. Do not think that I consider it wholly practical on any great scale, but I used the means I had at hand to get the greatest good from it. The outfit was put in more particularly for domestic use, as I had no water in the immediate vicinity. I have a two and one-half inch tubular well 244 feet deep, costing $500, a 240 barrel tank on a twenty foot substructure, costing $200, and a fifty foot tower with a fourteen foot Geared Duplex mill for $275, making a total of $1,000. The tank is in a grinding building to prevent freezing. The pump was adjusted to make about eight strokes to the gallon, so that it would take about seventy-two hours or less continuous pumping to fill the tank with an ordinary wind; but, unfortunately, the wheel was at a stand still about two-thirds of the time. I would state that the water flows to within forty-five feet of the surface. I have one-inch pipes to conduct the water to the berries, with hydrants or faucets at the higher elevations.

I started the mill as soon in May as the ground began to dry out and it remained open until after the blackberries were over. I generally allowed the water to accumulate to about two-thirds of a tank-full before using and then ran the hose to the upper ends of the rows

of strawberries and allowed the water to run under the mulch to the end of the row, and then moved it to the next row, and so continued through to the last row. I did not have sufficient water to go over the patch more than twice, as I was watering the new settings of strawberries during that time, and then had to transfer the water to the raspberries before they began to turn color. Where there was mulching there was no waste whatever and very little where there was none.

My yield of strawberries was 1,400 quarts from one-third of an acre, the receipts being $170.00, besides the value of berries that were eaten at home. The rate per acre would be one hundred and thirty-eight bushels or $510.00. The yield of varieties based on the length of row required for one quart of berries is as follows: Capt. Jack, 2¼ ft.; Crescent, 2½ ft.; Warfield, 2½ ft.; Haverland, 3¾ ft.; Glendale, 4 ft.; Parker Earle, 4½ ft.; Bubach, 5½ ft.; Lovett, 5⅔ ft.; May King, 7⅒ ft.; Mt. Vernon, 7½ ft.; Louise, 9⅓ ft.; Michaels Early, 10½ ft.; Gandy, 11½ ft.

You will observe that Capt. Jack as a producer eclipsed the Crescent and Warfield, in spite of its being a staminate; the Michaels Early was nearly at the foot of the list, or not much over twenty per cent. of the Jack. I think the Parker Earle would have done as well as the Haverland if it could have had the water but being a late berry the water was taken to the raspberries too soon. The prospective yield, if everything had been Capt. Jack, would have been 216 bushels per acre, and more water would have added to that considerbly.

Where there is so much lost space where Parker Earle and other slow running varieties are planted, I would humbly suggest that they be planted closer together, but maintain about two feet in the row and be able thereby to cultivate both ways with a horse.

I will state in conclusion as evidence of the severity of the drouth on fruit this past season that the one inch of rainfall in June, the .27 of an inch in July and the .55 of an inch in August were the smallest in twenty-two years excepting in August, 1883. Therefore, a windmill would not irrigate this year what it would nicely answer for in a season of ordinary rainfall; but in spite of that I would not recommend a mill unless it was found practical to have large cisterns or ponds and keep the mill going continually in order to store water for future use.

IRRIGATING WITH A "VAPOR ENGINE."

J. E. EMPENGER, HOPKINS.

My farm is situated in the N. E. quarter of sec. 26, half mile west of Hopkins. The land which I irrigate is on top of a hill sixty-seven feet above the level of Shady Oak lake, from which I pump water with a vapor engine. My engine house is located below this hill, four feet above the level of the lake. The distance of a three-inch suction pipe from the pump to the lake is 1,657 feet, the discharge pipe is two inches and is laid under ground deep enough to plow over. Hose bibs are attached at intervals so that every part of the garden can be reached with a hose; the hose bibs can also be left open and irrigation by furrows can be done at different places, if de-

sirable. In the presence of several persons interested in irrigating I have attached lawn sprinklers to hose and the results were beyond expectations; they *all agreed* that lawn sprinklers attached to hose set at intervals in the garden would bring grand results, as my engine could be started in the evening and would run *all* night without being looked after.

This vapor engine with pump combined is the most economical one in the market, requiring no boiler, no steam, no coal, no ashes, no dirt, no fire and no engineer. This is an engine which can be placed in your house or barn with perfect safety, as it requires no fire, is self-feeding, capable of being started by a boy and then left to care for itself. It can be operated almost as cheaply as a windmill, (which is subject to the elements and cannot be depended upon). But this engine has the "virtue" of always being ready to go at *full capacity* at a *moments notice*.

In computing the cost of running, the following facts should be taken into consideration. (I.) No expense until started. (II.) No necessity of starting until the power is required. (III.) Expense while running is always in exact proportion to the amount of power used. (IV.) The moment the engine stops, all expense stops.

My engine is a four horse power, and the expense averages from thirty to forty cents for ten hours. The capacity of water pumped was about 3,000 gallons per hour good measure. This quantity of water can be greatly increased; by changing a bolt on the engine, the stroke can be changed to discharge more water at will.

The pressure I get on top of the hill from my engine is strong enough to throw a stream of water over my house which is two stories high; of course, at the lower parts of the garden the pressure is much greater.

In spite of all the advantage I had over the dry season, I did not make a fortune last year by raising fruit, but I have learned some *solid experimental* facts, and I hope that by your next meeting I shall be able to be with you all, and bring some of my irrigated fruits and some cream to.

I will be glad to correspond with those who are interested in irrigations and wish to find out more about my system.

NOTES ON IRRIGATION.

WILLARD BUCK, ALEXANDRIA.

"I am glad the subject of irrigation is getting before the people. Minnesota is quite a dry state. For small fruit and garden truck, we must irrigate to make it a success, but at present the people are asleep on it. They must wake up to succeed.

In this city of Alexandria, I have a windmill and stone reservoir that holds over six hundred barrels. The water comes from a slough and is fresh and warm. A two-inch pipe carries the water to where it is used.

I was the only one in town last season who had a good garden. It attracted much attention from most of our prominent people, including my neighbor, Gov. Nelson. Well, I have had my experience in *South California*, and am at home at it. Yours for progress."

IRRIGATION IN THE EASTERN STATES.

A. J. COOK, M. S., POMONA COLLEGE, CLAREMONT, CAL.

Such disastrous drouths as that which occurred during the summer of 1894, in nearly all parts of the United States, should arouse the best thought and study, and stir to fullest action the inventive genius of our people. If by thought and plan we can, even in some slight degree, fence against such loss as has been experienced in the frequent drouths of the last few years, it is certainly most desirable to give the thought and inaugurate the plan. If the farmer sees liberal reward ahead, he will endure cheerfully hard effort. Even slight compensation may make such labor endurable.

It is more than probable that on many a farm in the East irrigation might be introduced that would more than pay large interest on the expense each season, and would yield startling profits in such years as that of 1894. Southern California was visited by a very severe drouth in 1894; yet so little was this felt by the orchardists that it is probable that the crop of fruit for 1895 will be the largest and will bring the largest cash returns of any crop ever grown in the section.

On a farm which I own in Shiawassee county, Michigan, on the left bank of the Maple river, near its source, is a spring brook which takes its rise entirely on the farm. This brook never dried up nor froze over. Because of this, several acres in the very center of the farm bore little else than flags and sedges, and by tempting stock in the early spring to reach for the fresh green herbage often plunged them into mud and water, that coated them with dirt, even if they were so fortunate as to get out without aid. Besides this, a considerable area of excellent land farther down the stream, so level that the stream zigzagged from side to side, was only valuable for pasture, and could not be plowed. I drained the entire place by use of underground tile, and occasional open ditches furnished water for my stock. The fall in the upper portion of the stream was exceedingly great. The largest tile—those used at the lowest portion of the stream—are one foot in diameter. Even in seasons of greatest drouth these large tile run half full, and with a strong current. Thus I have converted all my land into excellent plough-land, have replaced an unsightly quagmire with beautiful fields; but, possibly best of all, I have water available for irrigation, by which I can make a large area of rich land productive even in the dryest seasons, when prices are sure to be very high.

My farm is not an exceptional one, but is a type of many in Michigan, Ohio, New York, etc. It is very common to find on both sides of the larger brooks and rivers numerous brooklets, rising in springs and emptying into the larger streams. Nearly every large farm has its quagmire of springs, sedges and flags, its beautiful streamlet, usually with rapid current, and its greater or less area of low level ground along its lower course, where it winds back and forth. Often these brooks are larger than the one on my farm, in which case it will be more difficult and expensive to underdrain. In such cases open ditches may be used. These are less expensive,

and, though not in some respects so satisfactory, may be more desirable than the larger expensive tile.

Since coming to California, over a year ago, and observing the ease with which irrigation is practiced, and the wondrous growth and fruitage which result from abundant water, I have thought what a wealth I have in the brook on the old farm, and how that wealth has run to waste in all the past. Last season a large acreage of beans and potatoes on the level flat gave very meagre returns because of the severe drouth. They would have yielded bountifully had the water been utilized. I have always prized the brook for its beauty, its excellent water, always so delicious to drink and so valuable for stock, but I am now convinced that its greatest importance has been entirely overlooked.

In the upper part of my underground drain the fall is very great. On one side of this drain is a natural basin, with a deep, stiff, clay subsoil and backed with a clay hill. In a week or two a man with team and scraper could form a pond of nearly an acre, with a depth of several feet. In case gravel was struck in digging for this pond clay could be easily secured from the hill, which would form an impervious bottom. Thus in a brief time and at slight expense, a fine fishpond and excellent irrigating reservoir could be constructed. We next have to level the "flat" that is to be irrigated below the pond, so that by ditches the water can be made to pass along the rows of potatoes, beans, etc., at pleasure. On my farm the low ground is already so level that I am sure, with slight expense, the whole lower flat can be fixed so that the water can be conducted to every part of it with slight labor and care. I feel certain that the entire expense of arranging the lower area for irrigation need be hardly more than the added profit of the crops for a single season like that of last year. The large fall and rapid current will make it easy to conduct the water into the pond at the upper end and let it pass out at the lower side into the drain again.

When we are ready to irrigate we have only to run a furrow along the upper border of the area to be irrigated at right angles to the general course of the stream, so that it shall have slight fall. Through a convenient gate the water is conducted, as desired, into the furrow which skirts the upper margin of the flat, and from this into other furrows which run at right angles to it, and between the rows of plants to be watered. A man with hoe and spade can easily dig and bank up the ditches and furrows so as to conduct the water where he wishes it. Unless the fall is heavy in the main ditch or furrow it is not hard to manage the water and conduct it at will when it is desired. By care and close observation the first furrow can be run in a direction so that the fall and current will be gentle.

I have no doubt that at no distant period many of our streams will be utilized for irrigation, greatly to the advantage of the farmers on whose lands the streams are found. Whenever the land is sufficiently level to permit of irrigation there can be no question of the profit of such enterprise.—*N. Y. Tribune.*

SUB-IRRIGATION.

F. H. NUTTER, LANDSCAPE ARCHITECT, MINNEAPOLIS.

One of the beauties of the jury system as often administered in our courts is the fact that no one is considered competent to pass judgment on a matter until he has confessed to total ignorance, in that direction at least; and so, at the outset, I will prove my capability to treat this subject without prejudice by saying that I know nothing at all about it from a practical standpoint.

From my experience the past years with parks and other improvements, the necessity for some system of applying water both abundantly and economically to lawns and trees and shrubs becomes very apparent, and the idea struck me of utilizing tile or other drains for that purpose by a sort of reversion of their usual duty; and for a while I nurtured my mental offspring with considerable pride and a hope of a glowing future for it; imagine then my horror when a little investigation proved that it was not my child at all, but already boasted as extended a list of progenitors as the sewing machine or electric telegraph. But the thought had become attractive to me, so I haunted your secretary's office, examining different reports and magazines to see what light they could throw on the matter, till that worthy official invited me to confide my thoughts to paper, probably hoping by this vicarious suffering on your part to get a respite himself; but for your comfort I can assure you that his scheme was a total failure. However, by correspondence and study of what literature I have been able to obtain I have investigated the subject, and what I here present is more in the way of a compilation than an original article.

I have concluded that there are two reasons for the ill success which has attended many attempts at irrigation in this section of the country. The first is, that good irrigation does not require so much water as we think, and the second is, that it requires a good deal more. To explain this apparent paradox, I will say that the usual practice is to apply a small amount of water daily, which to a certain extent may have the effect on vegetable growth that a continual indulgence in stimulants may have upon the human system, even if the party is never intoxicated.

A California authority on irrigation states that for many crops one application of water in a season is all that is necessary, while none will require more than three; but these applications of course are thorough soakings. In the meantime, thorough cultivation of the top soil is practiced to maintain the soil mulch.

To return to the special subject of sub-irrigation. As is evident, this refers to application of water below the natural surface of the the soil. In California this term is sometimes applied to tracts of land which reap the benefits of adjoining or former irrigation; a forty-acre tract surrounded by irrigated lands is sometimes reclaimed itself, or if neglected after having been irrigated for some years, the saturated sub-soil will for a while maintain it in bearing. But the division of the subject of which I speak refers to the direct application of the water by means of tile or other appliances buried

beneath the soil deep enough not to interfere with the prosecution of the usual gardening operations.

The advantages claimed for this method are economy in amount of water, and applying it in such a way that there is no loss from evaporation, and that the surface is always in condition to be worked; the disadvantages are, of course, in the question of expense, though it may be said that to properly prepare ground for surface irrigation also involves considerable expense.

For lawn purposes this method is in considerable use, both in the East and in California, and in many places is so adapted as to be in wet seasons a method of drainage also.

Our usual methods of sprinkling lawns has the disadvantage of drawing the grass roots to the surface, as the moisture does not penetrate to any depth, and if neglected for awhile the hot sun soon does its disastrous work, while if sub-irrigated the roots penetrate to a greater depth and are more favorably situated to resist drought.

For lawn purposes the tile should be two to four inches, laid about twelve inches deep and ten feet apart, the lower half of the joints cemented but the tops open; laid on a level if possible, or nearly so, and at the upper end connected with an upright pipe through which the water may be introduced, and, if drainage is desired, at the lower end with an outlet drain which may be opened or closed as occasion may require.

The last report of the Ohio State Horticultural Society gives accounts of experiments in this line, some of them in rather a temporary fashion, which still gave good results. One cultivator of celery laid tile on top of the ground between the rows, by which means he applied water without washing the surface. In banking up the plants the tile were also buried, and water still applied through them with good results. Another, a cultivator of small berries, I believe, dug trenches between his beds in which he buried a foot or so of cornstalks laid lengthwise, in lieu of tiles, and covering them, applied the water through them.

At Cornell University experiments have been made in connection with bench work in the greenhouses, by means of two tiles, and the results were quite marked.

Briefly to enumerate the results, I may say that at Cornell the saving in amount of water was about one-half, and plants subject to rot and injury from excessive dampness were in much better condition. This last item in connection with fruits and vegetables is also noted from California.

Experiments in California in trial beds where the tile were very closely laid and planted with early beets, onions, potatoes and string beans, the results were as follows: Early beets no special gain as the season itself was quite wet; onions and beans were watered five times. Increase of onions fifty per cent.; increase of beans over one hundred per cent. in weight, and season much prolonged.

The Michigan Agricultural College reports: It is enough for any crop in any soil to apply 1200 bbls. per acre, once a week. In many soils sub-irrigation will require only one-third to one-half this amount.

Only one station, Lincoln, Neb., reports unfavorably, but admits that the trial was not made under the best auspices, as the plant had been laid four years, and neglected till the wooden tank had dried up and fallen away; part of the pipe was only one-half-inch iron, perforated every foot or so with one-fourth-inch holes; as four of these holes might exhaust the water in the pipe, it will be seen that the method might have its weak points.

DISCUSSION.

Pres. Underwood: I would like to ask the gentleman how large a pipe would be necessary to irrigate a row 600 feet long and how near to the top the pipes should be laid.

Mr. Nutter: From what I have learned I do not know whether any main has been carried so far. It is the practice to use two or four inch tile. The water escapes at the joints. The tile would carry the water two or three hundred feet without much trouble.

Mr. Brown: Then that tile would be preferable to iron pipe?

Mr Nutter: I think so.

Mr. Brown: You irrigate under the ground instead of on top?

Mr. Nutter: Yes, sir; the tile is laid sufficiently deep to escape the cultivator and the plow.

Mr. Gage: I laid some of the first tile that was ever laid in the United States. There was a man who had a farm on which he could not raise three bushels of wheat to the acre, so he went to Scotland and got a man and went to work and laid these tile, and he increased his crop so that the work paid for itself in wheat, and before he died he had laid 56 miles of tile on his farm, and increased his wheat yield from three bushels to forty-six bushels per acre.

Prof. Green: I had a little experience the past summer in sub-irrigation. I have a lot at St. Anthony Park, and it bothered me a good deal to water my shrubs. I always used a hose, but last spring I laid some hollow brick; I laid some hollow brick right alongside of those shrubs from the house, and it was the most satisfactory way of irrigating those shrubs I ever experienced.

WATER FOR SPARTA, WIS., FRUIT FARMS.

Sparta, Wis., March 27.—The city council last night awarded the contract for a system of waterworks. The plant includes power-house, engines, mains and reservoirs. The power house will be located near the iron works and the reservoir will be built on the top of Hollow Bluff, and when full the water level will be 142 feet above

Main street. This is an ideal place for a reservoir as all points are easily accessible from the bluff. The supply of water for city purposes will be derived from wells driven into the rock, while, if this supply is inadequate for irrigating the many small fruit farms, arrangements have been provided for pumping for that purpose directly from the La Crosse river.

Owing to the severe drouth last season the berry crop of this place, of which Minneapolis receives about 1,000 cases per day from June 10 to Aug. 30, was nearly a failure, causing a loss to Sparta of about $100,000.—*Minneapolis Journal.*

HOW BEST TO IRRIGATE.

FROM "THE SALT LAKE HERALD."

In reference to orchard irrigation, I believe too much water is applied to our orchards, and in a very wrong manner. Frequent irrigations of the surface of the soil are not sufficient for good results on trees. Not enough water is applied at one time to reach the deeper roots, and as a result, while the surface soil may be perfectly moist, the deeper soil is quite dry and the trees present a sickly appearance. Surface irrigation is conducive to great evaporation and loss of moisture. My plan of irrigating an orchard is to apply enough water at one time to reach the deeper roots, and then retain that moisture in the soil by cultivation and keeping the surface of the soil loose. I think the best method of applying water to this end is to block the orchard off in squares, using for this purpose an instrument made in the shape of a letter "V," but open 12 to 16 inches at the narrow end. Two planks are used, 12x14 inches wide, 10 feet long, nailed securely in the shape described. A team is hitched at the broad end and driven through between the rows, collecting the dirt in ridges. The orchard is gone through with in this way, and then cross-ridged in the same manner. We now have the trees in the center of a square with ridges 10 to 12 inches high between the rows to retain the water. The water is turned in at the upper end and allowed to run to the lowest square in the row. This is filled and then shut off and the next one above is filled, and so on back to the first, or upper square. By this method of irrigation a person can approximately tell the amount of water he is applying. This method was adopted in the experiment station orchard last year, which is located upon very dry land. Two irrigations were given. Probably between twelve and fifteen inches of water was applied. As soon as the land was sufficiently dry the orchard was thoroughly cultivated to loosen the surface soil and prevent evaporation. The orchard made better growth and is in better condition than ever before, and I believe the result is largely due to the method of irrigation.

Small Fruits.

BERRIES FOR THE NORTHWEST.

C. E. TOBEY, SUPT. THAYER FRUIT FARMS, SPARTA, WIS.

Strawberries have grown wild in Wisconsin and Minnesota, and have been cultivated in a small way since we became commonwealths. Raspberries and blackberries have grown wild in almost every turn of the road, but during severe open winters the expected crop has been destroyed, and if they were to be had at all, the cultivated varieties have been purchased from our Southern or Eastern neighbors. During the past few years Wisconsin and Minnesota have awakened to the fact that they can not only supply the home demand but also the increasing demands of their Western, Northern, and Northwestern neighbors. The increasing knowledge of right varieties to grow and thrive within our borders, the knowing how to plant, cultivate, care for and, last but not least, to protect during our severe winters, has placed this industry in our state of Wisconsin (and I know this to be true to a certain extent in your state) on as sound a foundation as the dairy or any other of our great agricultural industries.

At Sparta, now the great berry center of Wisconsin, the birth of this new industry occurred at the first farmer's institute held in our city. It was at this farmer's meeting that the possibilities of the culture of berries, both commercially and in the home garden, was brought to our attention. Since then, notwithstanding the cry of "You will overdo it," the demand has increased faster than the acreage, and the acreage has increased from year to year until now over 500 acres of berries are being cultivated. The market is found in northern Wisconsin, Minnesota, the Dakotas and Manitoba.

To bring the true value of this industry to the attention of the farmers of our own state, I have made the following statements at our farmers' institutes, and now make them to you: *One acre of well cultivated berries of varieties known to do well in your locality will net you more profit than 10 average milch cows or 40 average acres of grain.*

Some farmers will at once ask me the question, "Can we market berries successfully, our farms being six, seven or eight miles from a railroad station?" Most certainly you can. There is a limit, however, to the acreage of the farmers thus situated, depending upon the man, the family, their surroundings and circumstances. Many farmers within four, six or eight miles of Sparta are now making a business of berries and the regular farm products are made secondary to this new industry. Don't understand me as advising farmers to stop growing corn, wheat, oats, milk or pork, but *give the berries a show.*

This year we bought on our farms with a bushel of our berries a barrel of friend Phillips' best apples (in fact, Secretary Phillips sent

us to barrels, but we were only allowed to pay for one). Later one bushel of berries bought for us a barrel of Jonathans from northern Wisconsin and delivered them at our door; and other single bushels of our berries bought for us eight bushels of rye, seven bushels of potatoes, seven bushels of wheat, twelve and a half bushels of oats, fifteen pounds of butter, one and one-fourth cords of dry oak wood, 150 pounds of best flour, 800 pounds good timothy hay and other necessaries in proportion. With these figures starring us in the face, is it reasonable for farmers to turn their backs on this industry and say, "I can't spare the time from other farm work"?

You may say, "I don't know how to rightly embark in the business of growing berries;" but you are bound to succeed with the practical information you can obtain through this society, its deliberations and annual reports containing a list of varieties that are known to be profitable for you and also giving advice how to plant, grow and market.

Your state also offers a course in agriculture at St. Anthony Park; one of the studies being "Horticulture," taught by one of the most practical theoretical horticultural teachers that it has ever been my good fortune to meet, visit and consult with, a man whose reputation extends beyond the confines of your state, throughout the United States, and of whom Minnesota should be and is truly proud.

Now, a few words to the young farmers or the boys on the farm who are looking forward to getting away from the rural home into the village or city—any place, if it be only off the farm. I should also like the ears of the fathers and mothers who want the boys to stay where they are.

I believe with the advent of this berry industry the boys on the farm have a chance to better their condition and commence a business at home that will pay them better dividends in money, health and happiness than they would procure in the village or city. Take the lease of one-fourth, one-half or one acre of the farm and pay a price per acre fully as much as it has brought in actual profit on an average for the past three years; take a written lease for five years with privilege of five more at its expiration. And right here I want to call the attention of the fathers to the fact that the pig given the child should not be sold as the father's hog, but that the young farmer should have the whole hog or none. This one-half acre berry farmer must attend to the actual business and work of this farm himself, and must have all the profits himself.

I believe this a practical way of interesting the boys in a business that can be carried on at home. Many young farmers are attending our Sparta schools this winter with the profits of berries that were grown, cultivated and marketed by them.

I am requested by your secretary to devote a few minutes to gooseberry culture, which has received more attention during the past few years than has been heretofore accorded it.

The demand for this berry is rapidly growing, especially the ripe gooseberry for dessert, and both the green and ripe for preserving. The profits are fully as large as in any other small fruits and the worm is easily combatted by spraying, and even the English varieties

that have heretofore mildewed are now fruited successfully with the aid of liver of sulphur and the spray pump.

Last spring we set out four acres of the Downing gooseberry and about one-fourth acre of a new variety not yet introduced, called the Queen. These were mostly two-year-old plants and pruned and trimmed according to Mr. Thayer's directions as follows: All new buds that had started below the ground were broken or rubbed off and only the strongest cane allowed to remain, all branches or laterals being trimmed off between the surface of the ground and a point six to ten inches above, and the laterals above this point were trimmed out and cut back so that each bush was literally a well trimmed tree.

These little trees made a wonderful growth even during the drouth of 1894, and presented a beautiful appearance in consequence of their tree shape and the green foliage which appears on them earlier in the spring than on any other small fruits, and holds this appearance in the fall after all other foliage is browned by severe frosts. I think, too, that their being set in exact straight lines both ways, allowing the visitor to observe the straight rows in six different directions, gave them a uniform geometrical appearance. These plants were set in rows seven feet apart and three and one-half feet apart in the row.

We consider the Houghton and Downing the best varieties now grown extensively, although several new varieties we consider promising, among them the Columbus, Red Jacket and Queen. That much heralded, much advertised English variety, the Industry, is as pronounced a failure wherever we have heard of it as with us.

The possibilities are from 300 to 500 bushels yield per acre, and the prices have averaged higher than currants and about equal to prices of strawberries, raspberries and blackberries.

Minnesota and Wisconsin are sister states and alike interested in the growth of this new industry—our tastes, climate and soils are similar. Best varieties with us are best with you, the size of your cases should be the size of ours, our pints, quarts and bushels should be yours, and our markets being practically the same, we should work together as one family to the best interests of berries for the Northwest.

REPORT ON SMALL FRUITS.

WM. DANFORTH, RED WING.

The season of 1894 has been unlike any year that we have had since I have been in Minnesota. The spring time was rather late; we uncovered our strawberries about the tenth of May. We generally have a frost about the fifteenth of May, and after that we do not have much fear of frost; but on the nineteenth of May we had a heavy frost. Our field was heavily covered with straw during the winter and had just been uncovered a few days; we had put it between the rows so that it may have been some protection to the blossoms against the frost. We estimated our loss from five to ten per cent. The crop from three and one-third acres was 190 bushels.

We began picking June thirteenth, and we picked until July fourth and some until July tenth. The varieties that we have are Michaels Early, Wilson, Maxfield, Monarch, Crescent, Bubach, Bederwood, Parker Earle, Mt. Vernon and Jessie.

To prepare the ground for strawberries it should be enriched previous to the year you plant so that the fertilizer shall be thoroughly mixed with the soil; we have the rows four feet apart. Our soil is a sandy loam with clay subsoil. The ground for strawberries should be rich, ploughed deep and well pulverized, plants set firmly, roots well spread, blossoms all cut off the first season and runners clipped and thorough cultivation; allow no weeds in the field. After picking we mow the field as close as possible, then drag several times over and go over with forks and rakes and be sure that everything is stirred up and light, not anything packed down; and I was instructed to set fire at about two o'clock p. m., as at that time we have the most wind of any time in the day. The last year it was extremely dry and for ten days it was a bad sight to look at, but then as usual the plants began to show themselves and, I think, looked as thrifty as any that I have seen. We have a plough without a mouldboard to go out and back in the same row leaving the earth level, and then we hoe as in the new field. By this method we kill all weeds and destroy the weed seeds.

Raspberries—We have the Turner, Philadelphia, Cuthburt and Shaffer; for black varieties, Doolittle, Mammoth Cluster and Gregg.

We had a fair crop of plums, the Desota, Rollingstone and many wild varieties.

Blackberries—The Ancient Briton. On account of the dry weather and want of care, we had a light crop; have no success with the Snyder.

DISCUSSION.

Mr. Tobey, (Wisconsin): Do you consider ashes much more important for berries than for corn?

Mr. Danforth: When you are up on a high hill and put ashes in the rows it makes a big difference, but it makes the most difference in strawberries. I think ashes are worth twenty-five cents a bushel.

Mr. Pearce: We find phosphoric acid, and we find about 105 pounds of potash in a ton of ashes. There are certain things that produce buds and fruit, and that is often what we want; we often have a growth, but we have not the buds. I do not wish to say much on this subject, but it is an easy matter to grow strawberries.

Mrs. Stager: Does it make any difference what sort of wood ashes are used? We have pine ashes, all that we want; are those of any good?

Prof. Green: The hardwood ashes are very much more profitable; pine ashes are worth something, of course, but you can-

not afford to pay for them as for hardwood. One point in Mr. Danforth's report I want to speak about. He spoke about renewing the strawberry beds, using a plow without a mouldboard. I was down at the Thayer fruit farms, and Mr. Tobey told me he had used a cutaway harrow with the two center discs taken to renew his strawberry beds. For such a purpose the cutaway harrow cannot be equaled. Last summer I used a double shovel corn cultivator, but I know what that cutaway harrow can do, and for renewing a strawberry bed it has no equal.

Mr. Crandall: I have used a cutaway harrow for the past three years. Taking out the two outside discs and then straddling the row, going over it twice; it cuts the ground up thoroughly and leaves it very fine, and all the rain gets into the ground. Before we harrow it, we give it a top dressing.

Mr. Brackett: Would you have this manure fine, before you put on this top dressing?

Mr. Crandall: We take manure that is thoroughly worked up. Cleaning out the hog lot or the barnyard. That is the only preparation we ever give the manure.

Mr. Brackett: In relation to putting ashes on vines. I have been putting ashes on grape vines. Is it more practical to put them on strawberries? I was surprised to hear that ashes were worth as much as twenty-five cents a bushel.

Dr, Frisselle: I have always been a great believer in ashes, hardwood ashes. When living east on the Hudson river I used to buy ashes at twenty-five cents a bushel, and found difficulty in getting them. When I came west I found that ashes were thrown away; people were glad to get rid of them. I asked a farmer why he allowed so many to go to waste. He said they hurt the land. I was surprised; I could not and would not believe it. I think there is no better fertilizer for the vineyard than wood ashes. Two years ago I secured seven one-horse loads which I distributed through my vineyard of one thousand vines; I think there is scarcely any crop that is not benefited by wood ashes. I think one can make no mistake by putting on an abundance of wood ashes in the currant patch; it always improves the quality of the fruit.

Pres. Underwood: What about putting them on strawberries?

Dr. Frisselle: They are excellent on strawberries.

Mr. Brackett: We cannot put wood ashes over the whole plantation of fruit. Where one can get plenty of manure, and

only a limited quantity of ashes, would you recommend putting the ashes on the grapes and the manure on the other fruit?

Dr. Frisselle: I do not know whether ashes would be better for grapes than for strawberries; they are excellent for both.

Mr. Brackett: Manure is not good for grapes.

Dr. Frisselle: I put all the manure on my grapes I can get. It is wise to plant a vineyard on good rich land. There is no use in trying to grow fruit on land that is not properly fertilized.

Mrs. Stager: I only have a little wood ashes, but every year I put on a lot of manure, and put it on the grapes. My grapes are so thick they are a show for the place. I manure them thoroughly every year.

Mr. Pearce: I think everybody should study the habits of strawberry plants before trying to raise them. For instance, we take the Bubach, we take the Wilson; they are both nice plants; they are tolerably large plants. In the first place those varieties, and all such varieties, require nitrogen. They do not seem to require ashes, from the fact that they are overloaded with fruit. They should always be grown in the hill. These varieties should never be grown in matted rows; they should be confined to hills, with a soil rich and mellow. Now we will take a strong growing plant and plant it in hills and we will get no results; it will be a failure. Now make your selection. This is the first consideration. By that I mean you should never take a plant until you know the requirements of that plant. I take the Gandy, that is a very late crop and a very small, rapid grower; you cannot fruit it everywhere; it requires good soil, but it does not require soil as rich as the Bubach or the Wilson; it requires less nitrogen; all that variety wants is ashes, potash. It requires phosphoric acid. It wants something to produce buds and blossoms. We are not going to be confined to ashes, because we cannot get one-tenth of what we want. We have got to apply those other remedies; we must use our best judgment; we must not jump at conclusions, and we will get good results; we will get just what the plant wants. One variety we plant on clay ground; take another variety and it wants a light soil. To carry this thing further, I can show you a man who gets four hundred bushels to the acre. He confines himself to one or two varieties. He can grow the Wilson strawberry to perfection. Nitrogen, nitrogen, that is the success.

SMALL FRUITS FROM A COMMERCIAL STANDPOINT.

L. G. KELLOGG, JANESVILLE, WIS.,

President Wisconsin State Horticultural Society.

It is a stubborn fact that there are hundreds of car loads of strawberries, raspberries and blackberries grown in Michigan and Illinois, and distributed in the markets of Wisconsin, Minnesota and the Dakotas at fairly remunerative prices, at the same time the same varieties of fruits are ripening in central Wisconsin and Minnesota. With a love for horticultural pursuits and an adaptation for the business, is there not a grand opportunity for the commercial fruit grower to endeavor to supply at least a portion of this trade?

With an ever increasing population and a consequent growing demand for fine fruits, I do not believe the possibilities of the production and distribution of small fruits have been anywhere near realized. With the improved varieties, the improved packages for handling, and the rapid transportation facilities, it is now possible to distribute these perishable fruits from California to Maine and from the Gulf to the British Possessions.

There has been a great stimulus in the establishment of large small fruit plantations the past three or four years, but these are scarcely keeping pace with the ever increasing population. People are becoming more educated to the fact that fresh, ripe, wholesome berries are much more healthful than meats, especially during the warm season. Look, if you will, in the markets of Chicago, St. Louis, St. Paul, Minneapolis, or other cities of the Northwest, and see the tons and tons of incipient, half-ripened California fruits, brought nearly 3,000 miles to market, and then ask yourself the question, will not fresh, delicious, well-ripened fruit produced on Minnesota or Wisconsin soil, with less than one-quarter of the freight rates, find a paying market for years to come? No, the fruit business is not yet overdone east of the Rockies, nor will it be for a century to come.

I do not believe there can be an over-production of first-class fruit. The trouble lies in the fact we are producing too much inferior fruit as compared with the quantity of first-class, throwing it on the market in a haphazzard way as a result of not being organized, and thus demoralizing prices.

The quantity of small fruit that is sold without any margin of profit to the inexperienced grower is enormous. In the Chicago markets, it has been estimated during a single season by millions of quarts.

We frequently hear the alarm of over-production sounded, and when traced to the proper source we find it the result of injudicious and improper distribution. The question naturally arises, how are we to avoid this useless competition and properly distribute these small fruits? My answer would be, through the co-operation, or organization, of the fruit growers.

It is a commercial fact that competition cheapens prices without increasing consumption beyond the natural increase that follows cheaper prices. There is not a commercial fruit grower of any experience in the country but who knows that frequently during the shipping season a lot of small fruit would have gone into consumption at more money than was realized but for the useless home competition and improper distribution that cut prices below the cost of production. This is proved every season and is particularly true of the smaller towns where comparatively few people engage in the production of small fruits. It is this competition we hear spoken of as "ruinous competition" that has driven the most experienced and ablest men of the day into combining and organizing, not from choice, but from necessity, to avoid competing with one another.

The sugar refiners, the lumber manufacturers, the millers, in fact, nearly all branches of industry are now organized, simply because each tried to undersell the other, to get trade without increasing consumption. It has been demonstrated through a fruit growers association at Ripon, which has been in existence four years, that an organization through a course of inspection has a tendency to raise the standard of the fruit, systematize the business, reduce freight and express rates, and the grower can devote his whole time to getting his fruit in the best possible condition for the markets and thereby receive the greatest margin of profit.

Co-operation and the avoidance of competition is the order of the day everywhere. Everything is organized. Artisans, mechanics, laborers of every class and in all departments are organized for self-protection, to avoid competition, and act as a unit in all matters that pertain to their interests.

We believe in a progressive age and keeping abreast with the times, and we believe it is the duty of all fruit growers, as well as a necessity, to organize their shipping associations in a business-like manner, and so systematize their shipping as to avoid putting their products into competition with each other, and thus get a satisfactory and legitimate margin of profit. Fruitmen can certainly do this to their own advantage. By association and an interchange of views as to quantity, quality, and demand for fruit in a certain market it can be ascertained with approximate accuracy; and the fruit grower is thus enabled to lay his plans as regards varieties from the knowledge thus acquired.

Small fruit growing is a business in which location and convenient and rapid transportation are also essential elements of success. All engaged in it have a mutual interest in acquiring and availing themselves of all the knowledge attainable for growing, handling and marketing their products.

In all that pertains to horticultural development, the improvement of public grounds, the adornment of private property, the growing of fruits, *by co-operation* we work together in greater harmony, and more intelligently.

(See constitution, etc., of Fruit Growers' Association of Ripon, Wis., following).

CONSTITUTION, BY-LAWS AND ARTICLES OF INCORPORATION OF THE FRUIT GROWERS' ASSOCIATION OF RIPON, WIS.

(This is a regularly organized corporation under the laws of the State of Wisconsin.)

CONSTITUTION.

The name of this Corporation shall be "The Ripon Fruit Growers' Association," and the location of said Corporation shall be in said City of Ripon, County of Fond du Lac, and State of Wisconsin.

This corporation shall have no capital stock, and no dividends or pecuniary profits shall ever be made or declared by such corporation to its members.

The general officers of this corporation shall be a President, a Vice-President, a Secretary, a Treasurer, and a Board of five Directors.

The Directors elected on the organization of this corporation shall be elected to hold their offices until the first annual meeting; and thereafter all Directors elected shall be elected for the term of one year, except when elected to fill a vacancy.

The duties of the President shall be to preside at all meetings of the corporation; to sign all orders or warrants drawn on the Treasurer; and to perform, generally, such duties as devolve upon the President of similar organizations.

The Vice-President shall, in the absence of the President, perform all the duties devolving upon the President.

The Secretary shall keep a true, full and accurate record of all the proceedings of the corporation; shall draw and sign all orders or warrants on the Treasurer; and shall perform such other duties as may be prescribed by the By-Laws of this corporation.

The Treasurer shall be the custodian of the moneys of the corporation; shall keep full and true books of accounts of all moneys that shall come into his hands; he shall pay out no moneys of the corporation except on an order or warrant signed by the President and Secretary; he shall, at each annual meeting, and at such other times as the Directors may require, make a full and true report of his doings as such Treasurer, and shall perform such other duties as may be prescribed by the By-Laws.

The Directors shall have the management and control of all the property of the corporation; shall audit all bills against said corporation; and shall perform such other duty as may be prescribed by the By-Laws.

All applications for membership shall be in writing subscribed by the applicant, and giving his or her name, occupation, and number of acres of each kind of fruit grown. The election of members shall be by ballot, and six negative votes shall reject the applicant.

Any member may be expelled from the corporation, at any regular meeting, by a two-thirds vote of all the members present; but no member shall be expelled without first having had a full hearing on the matter complained of.

This corporation may adopt such By-Laws as may from time to to time be necessary; but no By-Law shall be adopted unless the same shall be presented to the corporation in writing at least one

regular meeting before such By-Law is adopted, and no By-Law shall be adopted except by a two-thirds vote of all the members present.

All elective officers, except as hereinbefore provided, shall be elected at the annual meeting of said corporation. All elective officers shall hold their respective offices until their successors are elected.

This constitution may be altered or amended by a two-thirds vote of all the members present at any regular meeting.

In witness whereof we have hereunto set our hands this 22nd day of February, A. D., 1890. Signed, P. S. COLLINS and others.

BY-LAWS.

ARTICLE I.

SEC. 1. The officers of this Association shall be a President, Vice-President, Secretary, Treasurer and a board of Directors.

SEC. 2. The officers shall be elected at each annual meeting of the Association.

SEC. 3. A majority of votes shall constitute an election.

ARTICLE II.

The President, or in his absence the Vice-President, shall preside at all meetings, and in their absence a presiding officer shall be elected pro tempore.

ARTICLE III.

SEC. 1. The Secretary shall keep the records of the Association in books to be furnished for that purpose; and shall attend to all correspondence of the Association not conflicting with the duties of the Agent.

Sec. 2. He shall procure and keep a book to be called the "Roll of Membership," in which shall be legibly written the articles of incorporation, and in which all persons elected to membership shall enroll their names.

SEC. 3. He shall notify all persons of their election within five days after such election.

SEC. 4. He shall keep a book which shall contain a list of all the property of the Association, and shall make a report of the same at at each annual meeting.

SEC. 5. He shall draw all orders or warrants on the Treasurer on the order of the Board of Directors.

ARTICLE IV.

SEC. 1. The Treasurer shall be the custodian of the moneys of the Association.

SEC. 2. He shall keep a true and accurate account with each member, and shall collect all moneys due the Association.

SEC. 3. He shall make an annual report to the Association of all moneys on hand, and the names of all members in arrears, and the amount due from such delinquent members. He shall also make a report when called for by the Board of Directors.

SEC. 4. He shall pay out moneys only on warrants or orders drawn by the Secretary, and countersigned by the President.

SEC. 5. He shall make a full report of his doings as Treasurer to the annual meeting.

SEC. 6. He shall execute a bond to the Association in such sum and with such sureties as the Board of Directors shall direct, which bond shall be approved by the Chairman of the Board of Directors.

ARTICLE V.

SEC. 1. The Board of Directors shall consist of the President, Secretary and three members to be elected from the Association.

SEC. 2. The Board of Directors shall hold meetings as often as the best interests of the Association may demand.

SEC. 3. The Directors shall have charge of all the property, effects and assets of the Association, including the management and general superintendance of its interests and affairs, where the same do not conflict with these By-Laws.

SEC. 4. They shall fix the amount of the Treasurer's bond and the number of sureties he shall give, and the chairman of the Board shall approve of the Treasurer's bond.

SEC. 5. They shall be the purchasing agent of the Association.

SEC. 6. They shall make rules for the Association by which its members shall be governed, and any other regulations not inconsistent with the By-Laws.

SEC. 7. Any Director who shall absent himself from three successive meetings of such Board shall be by said Board reported to the Association, and the Association may, thereupon, declare said office vacant, and forthwith elect a Director in his stead.

SEC. 8. The Directors shall promptly examine and audit all bills against the Association.

SEC. 9. It shall be the duty of the Board of Directors to appoint an Agent for this Association, whose duties shall be set forth in the By-Laws.

SEC. 10. Said Directors shall by majority vote select said agent, and agree with him as to his compensation.

SEC. 11. All votes taken by the Directors in selecting an Agent and fixing his salary or compensation, shall be viva voce, and each Director's vote shall be recorded in the minutes of the Association by the Secretary of the Board of Directors.

ARTICLE VI.

SEC. 1. The duties of the Agent shall be in general terms to act under the direction of the Board of Directors. To handle the Fruit and secure markets for the same; to do his utmost to get the lowest freight rates possible; to keep accurate accounts of each day's dealings with each shipper; to deposit all Drafts, Checks or Moneys in some Local Bank on the day they are received. To settle with all members at least once a week.

SEC. 2. His books, contracts, correspondence, and all other papers, or records, relating to said Association in his possession shall

be at all times open to the inspection of any member of the Association.

SEC. 3. He shall do his utmost to have the Fruit reach the market in the best possible condition, and in all ways promote the best interests of the Association.

SEC. 4. He shall be required to give a good Bond, in such a sum as the Board of Directors shall determine, for the faithful performance of his duties and that he will honestly account for all moneys coming into his hands as said Agent and disburse the same to those to whom they rightfully belong.

ARTICLE VII.

SEC. 1. The manner of shipping the Fruit, in general terms, shall be as follows: Each member of the Association wishing to ship Fruit shall deliver the same as directed by the Agent, each grower being required to have his or her name plainly stenciled on their crates.

SEC. 2. All the Fruit received on any day, from different growers shall be treated alike in all respects, and shall be shipped to points where wanted, irrespective of who raised the same, and each day's shipment shall be treated as an entirety. Every grower who contributed to said shipment shall be entitled to his or her share of the proceeds of said day's sale, in proportion to the number of crates shipped by said grower.

SEC. 3. All members of this Association shall have the right to dispose of Fruit raised by him or her to local dealers or other parties; provided they do not sell Fruit to parties to ship so as in any manner to come into competition with shipments of the Association.

ARTICLE VIII.

SEC. 1. The standing committeee of the Association shall be as follows: A committee on By-Laws; a committee on Transportation and Shipping Facilities; a committee on Grievances.

SEC 2. All standing committees shall consist of three members and shall be appointed by the President.

ARTICLE IX.

SEC. 1. The annual meeting shall be held on the second Monday of January in each year.

SEC. 2. The regular meetings of this Association shall be held on the second Monday of each month, at 7:30, P. M.

SEC. 3. Special meetings may be called by the President at any time, and shall be called by him at the request of the Board of Directors.

SEC. 4. Notice of any special meeting shall be given by publication in a weekly paper, published in the city of Ripon, or by mail, which notice shall contain a statement of the matter to be presented at such special meeting.

SEC. 5. No other business shall be transacted at any special meeting than shall be stated in such notice.

SEC. 6. Five members shall constitute a quorum at any meeting.

ARTICLE X.

SEC. 1. The membership fee in this Association shall be One Dollar, and no person elected shall become a member until such sum is paid and his or her name signed to the roll of membership.

SEC. 2. The annual Dues of each member shall be fifty cents, payable in advance, on the second Monday in January of each year.

SEC. 3. The membership fee shall include the annual Dues for the first year.

SEC. 4. When the dues or other indebtedness of any member shall remain unpaid for sixty days after notice, his or her membership shall be forfeited, and they shall cease to be members.

A member, thus forfeiting his or her membership, may be reinstated within three months after such forfeiture upon payment of all the arrears.

SEC. 5. All votes for membership shall be by ballot, and six negative votes shall reject any applicant.

SEC. 6. All applications for membership shall be presented at any regular meeting, and no ballot shall be taken on any application before the first regular meeting after its presentation.

SEC. 7. The application of no person who has been rejected shall again be received by the Association until six months has elapsed after his rejection.

ARTICLE XI.

SEC. 1. Charges of misconduct against any member shall be made in writing, and shall first be presented to the committee on Grievances, who shall investigate the same, and if, in their judgment, they are worthy of consideration, they shall be by them presented to the Association.

SEC. 2. All trials of members for misconduct shall be at a regular meeting, and no member shall be tried until at least ten days after service on him of a copy of the charges against him.

SEC. 3. Any member found guilty of such misconduct, or of the violation of any of the Rules or Regulations of this Association, may be fined or expelled after a full hearing, by a two-thirds vote of the members present at any regular meeting.

ARTICLE XII.

SEC. 1. All Bills or Accounts against the Association shall be referred to and audited by the Board of Directors.

SEC. 2. Upon a Bill being allowed as herein provided, a warrant for the same shall be drawn on the Treasurer to the order of the party to whom made payable, which, before payment, must be countersigned by the President, and such warrant shall specify the purpose for which drawn.

SEC. 3. No moneys of this Association shall ever be expended in behalf of any individual or in the furthering of any private business or enterprise, except by the unanimous vote of all the members present at a regular meeting.

ARTICLE XIII.

All business at any regular or special meeting shall be conducted according to usual parliamentary rules.

ARTICLE XIV.

SEC. 1. At the election of officers of the Association, each member shall be entitled to one vote for every 100 cases of Berries, or fraction over 50, grown by him or her and marketed by the Association.

SEC. 2. No voting by proxy shall be allowed.

SEC. 3. No member in arrears to the Association for dues, fines or assessments, shall be entitled to vote.

SEC. 4. In cases where Berry fields are leased or rented, the Landlord, Agent or Tenant, or any of them, may become members of this Association with all the privileges and rights to vote as other members.

ARTICLE XV.

SEC. 1. These By-Laws may be altered or amended by a two-thirds vote of all members present at any regular meeting.

SEC. 2. Any amendment to the By-Laws must be presented in writing at a regular meeting of the Association.

SEC. 3. No such proposed amendment shall be acted upon until the first regular meeting after its introduction.

ORDER OF BUSINESS.

Calling Roll of officers.
Reading of minutes.
Application for membership.
Balloting for applicants.
Reports of officers.
Reports of standing committees.
Reports of select committees.
Reading of communications.
Bills against the Association.
Unfinished business.
New business.
General welfare.

REPORT OF SMALL FRUITS IN FREEBORN COUNTY.

G. H. PRESCOTT, ALBERT LEA.

Strawberries wintered well and were in good condition for a crop, but owing to frost the most of the crop was destroyed. What was left the chinch bugs and drought spoiled. Raspberries were a fair crop, and prices good. Blackberries set very full and we thought to get a fine crop, but they dried on the vines just before getting ripe. I got a few poor berries from the Snyder; the Ancient Brittons were a total failure. I had a good crop of currants, and gooseberries were about half a crop.

THE MINNESOTA
HORTICULTURIST.

VOL. 23 APRIL, 1895. NO. 3.

Apples.

THE FAILURES AND SUCCESSES OF APPLE GROWING IN MINNESOTA.

WILLIAM SOMERVILLE, VIOLA, MINN.

We have had our failures in days that are past and fear we may have them in days to come. Many farmers will not learn from the experience of others, but still persist in buying their nursery stock from Eastern and Southern nurseries, represented by a set of men that know little of our climate, and whose only object is to sell trees. He tells of their superior qualities and that they are better than others because they are budded or have some other peculiarity that makes them superior to any trees in the market, at the same time turning over his book leaves, showing all the best and largest apple pictures of the country. He tells of their good qualities, of which he knows nothing himself, until the farmer forgets that these trees are raised under altogether different climatical influence, and that they cannot stand the hot summers and cold winters of Minnesota. Although they have been warned by the Horticultural Society and Farmer's Institute and almost every leading paper in the state, they continue to buy such stock and say, because they do not succeed, that apple growing in Minnesota is a failure, forgetting the principle, that trees, like corn, must be acclimated to our soil, climate and season. This has to be accomplished by seedlings raised in Minnesota or by Russian varieties that have been acclimated to such a climate for generations past.

Sometimes farmers will get good stock from responsible nurserymen or their agents, and expose them to the sun and wind during the day and at night throw them in the shade to protect their roots. The following day they will dig a hole a foot square and the same depth, thrusting their roots down into the hole, regardless of the condition of the ground, and expect a tree, and one that will bear fruit. Well, the tree does not grow or bear fruit, and the farmer feels that the nurseryman has swindled him. Could any other result be expected? The sun and wind had dried out their roots; and thrusting them into the hard ground, neither cultivating nor mulching them, how could we expect any other results? We have violated nature's

laws; first, by exposing their roots to sun and wind unnecessarily, next, by cramping their roots in a small hole that would not receive them in their natural state; also, by not cultivating or mulching the ground to stop evaporation as much as possible to save moisture and keep the ground cool.

If we raise fruit in our climate we must get our trees from reliable nurserymen or their agents, and the trees must be grown in Minnesota, either our best seedlings or our best Russians; then not expose their roots to sun or wind any more than necessary. If to be set in an old orchard to fill up vacancies, the ground should be spaded and loosened up at least four feet across, then set the tree in the center. If in a new orchard, the ground should be prepared as for corn, and the holes large enough to receive the roots in natural shape. The depth of setting trees depends upon the ground we set them in; if in heavy clay soil, four or five inches deeper than they come from the nursery row; but in light prairie soil, ten or twelve inches is the best depth—always setting on an angle towards the southwest, or the top towards the two o'clock sun, to protect them from sun scald on the southwest side. If not planted so, the prevailing wind from the southwest gets them erect before the laterals are long enough to protect the trunk. Then cultivate for the first four years. In case of drouth, mulch them. Cultivate any hoed crops between the rows, and seed to clover and pasture with hogs, ringing the large ones. When the trees come into bearing, mulch with straw or any rough litter every year, and success is certain with the right variety of trees.

Our nurserymen should be encouraged by buying from them and no others. They have labored long and hard, searching America and Europe, to get trees adapted to our climate. By a freak of nature, a few seedlings over the state have withstood the winter's cold and summer's heat. These nurserymen have bought the right to propagate from them at a large expense, placing in our hands a class of trees that is expected to stand our severe climate. All honor to the noble nurserymen! Their business has to be carried out by agents. If they did not send their agents out to sell their stock, agents from other states would canvass the country with unadapted trees and retard the growing of apples for years to come. It is true our nurserymen sometimes employ agents that have little respect for their words, frequently misrepresenting fruits, making promises that cannot be fulfilled, representing stock they have not got and tagging other stock to fill orders they have taken. In a few years the trees may bear fruit so different from what the farmer expected that he gets excited and tells his neighbors that "these trees were to bear large winter apples, but here are worthless little crabs getting ripe in September. I will not buy any more trees from that nursery; it is a fraud." So, nurserymen having agents should try to secure such as will do a square and honest business; the people hold them responsible for the acts of their agents. How different it is when agents come from Illinois, New York or any other state and sell trees to farmers! If one-half of them die the first summer or winter, and a few of them live to bear fruit, it makes no difference

how worthless, there is little said about it, and it is looked upon as a business transaction; but if that nursery is in Minnesota, it is a swindle and a fraud. They do not appreciate what nurserymen have accomplished in getting a class of fruit adapted to our climate.

Every farm should have a small piece of ground for plum trees. This should be as close to the barn as possible, so chickens could have free access. They will, to some extent, destroy the curculio, which is fatal to our fruit. Set eight feet apart. It is better to have two or three varieties. Keep well mulched with any coarse litter; straw is best because chickens will work in it more than in any other litter. There are a number of good varieties: Desota, Forest Garden, Weaver, Rollingstone, Hawkeye and many other varieties that will amply repay for labor bestowed. No farmer should be without this beautiful fruit.

ORCHARDING IN FARIBAULT COUNTY.

S. D. RICHARDSON, WINNEBAGO CITY.

Between fifteen and twenty years ago the tree agent put in considerable work in this section and, as they mostly represented Minnesota and Northern Iowa nurseries,there are today many good trees bearing fruit in Faribault county as the result of their labors. Many of the trees were bearing fruit previous to 1885. I saw many young Wealthys heavily laden with apples that fall. Andrew C. Dunn has a small orchard set at different times previous to 1878. When he set his first trees, he took pride in his young orchard and used to prune his trees so as to have them have tall trunks; later he got discouraged and let the trees alone; and the result is that many of the Duchess set first have a dead strip on the southwest side of the trunk, and the Wealthys planted later are healthy, vigorous, low-topped trees. This orchard is well protected on the west and northwest only. It was cultivated when small and has been seeded to timothy for the last ten or twelve years.

Mr. Sholl has a fine orchard of some two hundred trees, mostly Duchess, Wealthy, Minnesota and Haas. The Haas show the effect of the winter of 1885; aside from that the trees are in good condition. This orchard is protected on all sides. It was cultiva ted when small, but has been seeded for years. It was mulched several years ago. The trees are set sixteen feet apart each way and branch very low. On the other side of the road, a little farther north, is the orchard of Mr. Holly, on the high prairie, exposed to wind from every direction except what a few evergreens on the north and west may hinder. There were originally set in this orchard 700 or more Wealthys, set twenty-five or thirty feet apart each way. Mr. Holly sold one hundred and fifty bushels from this orchard in the fall of 1885, and it has been bearing heavily every other year and, sometimes, every year since, and has paid better in dollars and cents than any other part of the farm for the past ten years.

There are many other orchards as well worthy of mention as those I have named, but this paper would be too long if I undertook to

mention all of them. As far as I have noticed, the Wealthy, Duchess and Minnesota have done well in this county both with and without being protected by groves, on high ground and low, but not on wet ground. They seem to do the best when cultivated while small and seeded down when older.

One man mulches about three inches deep with strawy manure; the grass grows up through the mulching, and he gets a crop of apples every year.

One fact that I especially wish to call attention to is that with the most of these trees the body is well protected from the sun by the top. No need to put up boards or wrap the body with cloth or paper to keep from sun scald; the shade of the top is sufficient.

The men who have raised apples in this county have been mostly farmers and have been too busy with farm work to prune apple trees. One man who has not had much faith in years past in fruit will set out 1500 apple trees in the spring.

APPLES.

CHAS. LUEDLOFF, CARVER.

As a member of the committee on "Apples" I take notice below of such kinds of apples as have done best on my place, showing "blight-proof" for many years past, as my place is so located that many kinds get affected with blight. I don't know how many hundreds I have had for experiment, and from them all only those noted below are left free from blight. About my place as an experiment station for apples I must state first: The ground is low, with rich, black soil, sheltered around by high timber. You see this is not favorable for all kinds of apples. I think it is good advice to beginners in raising apples to begin with such sorts as are blight-proof—and they all are more likely to be when planted on high, dry ground with a free circulation of air; and where the ground is sloping somewha t to north it is always the best location for an apple orchard.

The blight is one of the greatest enemies in holding us back from raising apples. Some pomologists claim that spraying with the Bordeaux mixture is the only preventative; and I have good reason to believe it, because I kept my potatoes by spraying through the last two summers with Bordeaux mixture green to the time frost killed them, and splendid potatoes, too. Last summer, it may be, spraying helped some, but still the drouth was too great, and the vines died off earlier on that account. I think we have good hope in spraying all fruit trees early in the season with Bordeaux mixture to prevent blight.

Some persons believe that blight is contagious to the neighboring trees, but I have not found it so in the four following cases, viz: First, a European birch (Betula alba) stands east from a building; ten feet east from it stands a plum tree with some new plum grafts; the north side of this tree was sheltered by buildings; so this tree had a very warm place. The sun struck this tree most from one to two o'clock. One day both trees were affected by blight; a few days

later both were dead to the ground, while plum trees near by were not affected and are sound yet, but these plum trees had more of a circulation of air. Second, three small blocks of my experiment nurseries were each set with the same kinds of apple root grafts. Several years later I found in all the blocks blight on the same kinds, and the same kinds were free from blight in all three blocks. Only those varieties affected were liable to blight. Third, I had a row of Russian pear trees all in bearing, with pears on the size of a hickory nut. One day I saw that the first tree at the south of the row was beginning to blight, and in a week all the trees of the whole row were dead, and the odor near them had a sour smell. A row of plum trees on the east was sound, not in the least affected; on the west side was a row of apples of different kinds. I couldn't see any sign of blight on them either. Fourth, a European mountain ash (Pirus acuparia) north of my house, sheltered by evergreens of different kinds on the south side; on the north side was a row of very tall American white birch, the mountain ash being in the middle of these two rows. All branches that overgrew the evergreens were blighted, and all the trees around were free from blight.

Furthermore, the blight in our wheat field is manifested in the same way as on the apples. I have observed in my wheat field, on land that is situated south of timber, the wheat blights first. There it is too warm, dew lies longer upon the straw and ear, and after hot sunshine comes on the wheat gets blighted, because in such places circulation of air is less. Always in the middle of the field I found straw stiff, ear and kernel matured and no blight there, as there was always more circulation of air. Now, all my observation shows that the claim that blight is "contagious," or passes from tree to tree, is false; but right here I give the advise that we must discard such trees as are liable to blight. When a tree is blighted to some extent on its big limbs, it is better to grub it out, as then not the top alone is affected, it is in the roots also. Last fall I grubbed out four Transcendents *(this is the poorest in all to plant)*. I found the half of the crown roots dead just the same as the limbs. Such bad blighting trees should be grubbed out in good time and replaced by blight-proof trees. The hole should be dug large enough to take up all to burn, and the hole filled up with better earth.

Now, I add here a list of some kinds of apples, out of several hundred I have been experimenting with for some years past, which I have found free from blight on my place, viz:

Nos. 105, Grafenstein; 161, Longfield; 178, Barkoff; 180, Negaloff; 187, Glass Green; 225, Getman; 200, Rosy Repka; 240, Lieby; 260, Winter Stripe; 272, Little Flat; 275, Zolotoreff; 277, Vargul; 282, Veronesh; Reinette; 315, Lord; 317, White Pigeon; 361, Painted Pipka; 372, St. Peter; (378) 4 M. Hibernal; 385, Bade's; 410, Little Seedling; 413, Cross; 430, Round Waxen Acad.; 544, Juicy Burr; 469, Grandmother; (472) 4 M. Ostrekoff; 578, Leipzig; Borsdorf; 599, Romna; 981, White Russett; 985, Red Anis; 1277, Varonesh Red; 109, Var. Rubetz Nativii; 38, Varonesh; Malinda; H. Kaump's Seedling; Duchess of Oldenburg, Rimbacker (Germ.), October, September, Patten's Greening, Maiden Blush, Phillip's Sweeting, Phillip's Nos. 3 and 4.

Crab apples.—Gibb, Chase's Sweet, Greenwood, Shield's, Isham, Florence, Milton, Atztalan, Phoenix Red. Try them!

NURSERY AND ORCHARD TREES.

M. PEARCE, CHOWEN.

Mr. President, I think it is about four years since I have written anything for the state society or published anything in the horticultural papers of the state in regard to horticulture. I had almost arrived at the conclusion that I would never do it again. Now, what I have written is the way I do my own business, independent of what other people do. I read everything on the subject of horticulture I can get hold of, then I simmer it down, compare it with general laws and work on that special line. I have special objects in view in presenting this paper, and you will find it to be a little different from other papers, if you will pay strict attention. Some of it is like a bird crossing the water, now and then striking wing to the water, and if you pay strict attention you may find the bird skimming over the water.

Over forty years experience in growing fruit trees and plants in Minnesota convinces us beyond all doubt that apples and crabs of good quality can be grown in Minnesota in great abundance. In making the above statement it must not be understood to imply that all will make a success of growing apples; such is not the case in any country. Well qualified, long experience and advice from those who are able to impart it, are the best guarantees to success. Add to these energy and close observation, and you will succeed. For a number of years we have been deeply interested in the results of numerous experiments we have conducted with roots of all kinds on which the apple and crab are worked, also in grafting special kinds of apple and hybrids on special roots and then double working them with other varieties. In all of our experiments we have had special objects in view, such as preventing the blight, making the trees more hardy to withstand drought and cold and using a larger and better class of roots than are usually found on fruit trees. In some of these experiments, our success has gone far beyond our expectations; in others, it is too soon to state what the result may be.

Our nursery has been conducted for some years as follows:—(and we have no desire to return to old methods.) The ground on which we intend to set grafts in the spring is plowed in the fall. The plow is followed by a sub-soiler, and the ground is then harrowed level. If any part lacks fertility, we give it a light dressing of well rotted manure. The following spring we go over it with cultivator and harrow until it is in perfect condition. The grafts are set to a line not less than a foot apart in the row with rows four feet apart. Our scions are all cut late in the fall, packed in moist sawdust and placed in a cool cellar. The roots on which we intend to graft are packed away in the same manner. Our grafting is usually done in March, at which time we also do our top-working in the orchard. In put-

ting up apple grafts we are very particular to get them on pure apple roots. We use but one cut of the apple root, which is about five inches long from the crown down, the balance of the root being thrown away. Wealthy, Charlamof and some other varieties are double worked on Tonka, Beacher's Sweet and Virginia crab. We first work those last named on the roots, and then the Wealthy and other varieties on them. It can be done very successfully; we did not loose more than one per cent. The grafts are packed in moist sawdust and placed in a room where the temperature is about fifty degrees.

We put them out when the buds on the fruit trees just begin to swell, by which time the roots are all calloused and the splices grown together. We aim to keep the ground on which we set the grafts free from weeds. The grafts are not disturbed until they have made a growth of a few inches and are well rooted. We then commence cultivating with a light harrow or cultivator, and the hoe or scraper is also brought into use. The cultivation of all our nursery trees is very thorough until the first of August when we discontinue all work in the nursery till the first of September, when we resume cultivation for a short time. No weeds or grass are allowed to grow, and the ground is clean when the trees go into winter quarters. We use no protection about the roots of the trees whatever. We have not lost a single tree for years from root-killing. It is the least of our fears either in the nursery or in the orchard. We never trim the first year the grafts are set out, except to destroy all seedlings that may start with the grafts. The trimming is done the second year after the grafts are set out. We trim three times, the first in May, the second in June and the third in July. At the first trimming we remove only one-third of what is to be taken off. At the next trimming we remove another third, and finish the trimming complete the third time. We never strip or remove the leaves from the stem of the trees.

For the orchard select high, dry ground with a moderately heavy soil and a clay subsoil, rich and fertile. This we have found the best for fruit trees. A sandy loam with clay or clay and gravel subsoil is good. Fruit trees are adapted to nearly all soils, except those that are wet or sour. In all cases before fruit trees are set in orchard, the ground should be plowed deep, followed by a subsoil plow loosening up the subsoil as much as possible. The deeper and looser, the better for the trees in every respect. The trees should be set not less than twenty feet apart. It is a good plan after the first row of trees are set out to set the next row half way between. This will make the trees set out a little over twenty feet apart. Trees set in this way will greatly assist in checking the heavy winds. As much has been written and said, we will give only a passing notice of our experience and close observation for many years. All growers of fruit trees should carefully study and understand the offices performed by the roots. They are the foundation of all trees, as the wall is of all buildings. If the foundation is defective, whatever is built thereon will be the same. This applies to the roots of fruit trees in the broadest sense. Take a small apple tree; on it are three

kinds of roots, each having a special office to perform. Those at the top just below the crown are the feeders or supply roots. They go out horizontally in all directions ten to twelve inches below the surface of the ground. If the ground is loose and in proper condition, there appears to be no limit to their length and the throwing out of new branches, and in time the ground will become a web of roots, even if the trees are forty feet apart. Below these are another class of roots. They are known as the tap or anchor roots. They penetrate deep into the ground. Their office is to hold the tree firm and steadfast under all circumstances, and during a drought to supply the necessary moisture. A fruit tree without these roots is liable to be blown over or perish during a severe drought. Here in the center, between the feeders and anchor roots,is another class known as the fruit roots. They are short and stubby, throwing out numerous branches of the same kind. Such is a short description of the roots of fruit trees; and in setting fruit trees we should have these roots and the offices they perform constantly in mind and place the roots in the ground at a depth and in such manner that they will all make rapid growth. To accomplish this, they must neither be set too shallow or too deep. If too deep, there will be little growth of the tap or anchor roots, if too shallow, little or no growth of the feeders. Taking the various kinds of soil into consideration, it is a difficult matter to state just how deep a tree should be set. The depth must vary in different soils, but in no case so deep that the rays of the sun will not warm the soil about the roots and excite them to action with the least possible delay. For a fruit tree to remain inactive for weeks after it has been set is a sure indication of disease and a forerunner of death in the end. On an average, two inches deeper than a tree stood in the nursery is my rule.

Trees one and two years old from the graft and three to four feet high we consider the very best and most profitable that can be set in orchards or anywhere else. Keep this in mind. It is not a large quantity of small roots that makes the good tree. Vigorous and heavy roots are what gives health, growth and power of endurance to all trees. To secure the best results, the roots should be shortened in with a sharp knife just before the trees are set, allowing none over five inches long; also, the wood of the last year's growth should be cut back in the same proportion. If the above directions are carefully complied with, good and strong roots will be the result, together with an unusual growth of sound wood. Much care is required in setting out trees that each class of roots are in proper position. I verily believe that a large proportion of the trees set out each year are set back two or three years in their growth by bad setting, and they never recover a normal condition. The usual way that fruit trees are set is to place the roots in the hole, throw in some fine soil, then with the hand and fingers place it about the lower roots. So far this is correct. The hole is then filled up without any regard to the middle or upper roots and is tramped with the feet as solid as one or two hundred pounds weight can make it. In this way the feeders and fruit roots are either destroyed or pressed down around the main root of the tree. When trees are set in this manner,

little growth can be expected for years. To make a long story short, our method of setting fruit trees is to have all the roots in the ground just as they were in the nursery before the trees were dug. Our hands do the work of arranging and packing the soil about the roots. When a tree is planted out, press the top soil moderately with the foot. As a finishing stroke apply a wheelbarrow load of well rotted compost around each tree, extending out three or four feet, and give it a good raking with a coarse iron toothed rake.

Good cultivation must commence the first season the trees are set out and continue as long as you desire good trees and good fruit. Potatoes or any other crop of low growth may be grown between the rows of trees for the first two or three years; corn should never be grown in the orchard. Every fall treat your orchard to a light dressing of well rotted manure, followed by a shallow plowing in the spring, and then go over it two or three times during the summer with the harrow and cultivator. Keep the surface soil loose and mellow—it is the best of all protections against drought. All fruit trees should be allowed to branch out not over two or three feet above the ground. As a general rule, the bulk of plant food is found in the soil within twelve inches of the surface and below that depth it diminishes rapfdly. Nitrogen is seldom found more than twenty-inches below the surface unless the top soil has been heavily manured. Trees never make a good growth unless the roots are in the midst of plant food.

QUESTIONS AND ANSWERS.

Q. Why are you so particular to use apple roots on which to graft the apple? A. I find the pure apple root to be perfectly hardy and it will not kill unless the trees are set in soil naturally wet, in which event they will winter-kill.

Q. Why do you use only the first cut of the root? A. Because it contains the principal portion of the starch in the root, produces heavy roots and a good growth of wood.

Q. Why do you trim three times in place of once? A. It does not check the growth of the trees, renders them more stocky and creates a better root system.

DISCUSSION.

Pres. Underwood: If you have any questions to ask Mr. Pearce now is the time to do it.

Mr. Clark: In setting trees, would you lean them to the south?

Mr. Pearce: That is advocated a good deal.

A voice: What do you think of applying wood ashes to the trees?

Mr. Pearce: That is good.

A voice: Do you manure or cultivate your orchard?

Mr. Pearce: I do not want anything of the manure. I give them good cultivation, and after two years I can grow nothing there; the roots of the trees will take up all the surface of the

ground. After the third year a crop cannot be grown in the orchard without serious injury being done to the trees.

A voice: Do you think it is necessary in this part of the country to drain land for an orchard?

Mr. Pearce: A fruit tree will never live on wet land. The soil must be dry. If the soil is dry, it requires no drainage; if it is inclined to be wet, you will never grow apples on it.

A voice: Would you mulch the trees in the fall?

Mr. Pearce: I never mulched a tree in my life. I have set trees so shallow that some of the roots were exposed five or six inches. I never mulch and I have never lost a single tree by root-killing.

Mr. Ferris: You claim a hardy variety will not do on a tender root.

Mr. Pearce: I do.

Mr. Ferris: I have plum trees bearing on peach roots.

Mr. Pearce: I have taken seeds grown in Nebraska, in northern Illinois, Ohio, Indiana and Michigan, and in every instance I got an apple root that grew perfectly hardy. I never lost a root in my life. Wherever I got a hybrid, I met with misfortune.

Mr. Phillips (Wisconsin): Where do you get your apple roots?

Mr. Pearce: I get the apple and take the seeds out. If you want to grow a winter apple get seeds from a winter apple. Hybridizing has been the hardest thing I have had to contend with, and I have urged this society time and time again to establish an experimental farm to grow seeds way beyond the reach of insects to keep them pure. It ought to be established on an island to grow pure seeds.

Mr. Brackett: What would you do about bees?

Mr. Pearce: Well, you cannot get away from bees and mosquitoes.

FRUIT TREES.

NILS ANDERSON, LAKE CITY, MINN.

The first thought of was apples for man to eat, and if they were as good and beautiful as now, I do not wonder that Eve took thereof and ate. Every man, woman and child should have a good supply for at least five months of the year; and no home is complete without an orchard near the house. The few days that the trees are in bloom is a beautiful sight and is well worth the cost of the orchard.

Very great care should be taken in selecting the trees. Do not set any blighting varieties. The Tetofsky, White Astrachan, and Ukrain-

skoe are early, but of the Duchess of Oldenburg set the largest number. Wealthy and Walbridge are late keeping varieties. The list would not be complete without the Okabena, Peerless and a few Russians.

I am not so afraid of sun scald as I am of blight. Sun scald can be stopped, and the life of the tree prolonged, and it even will heal over. I have given blight a good deal of study, but as far as I have come is, if we have a good deal of rain in the spring we will have a good deal of blight in the summer. Also, if the trees are heavily set with fruit buds, the trees are weak, and the result is blight.

Every man should know how to graft and have on hand a few trees to replace any trees that die. I have to replace trees every year. I have over 300 small trees that I intend to use myself.

I am not discouraged. Wheat raising is a thing of the past, and grinding it into flour is going out of date. They have just found out that it pays best to feed it to hogs, and we must raise and eat apples.

Plums are the easiest to raise and still the most neglected fruit of all. The most of the farmers have a piece of ground called the barnyard; its purpose is as a driveway from the house to the barn. A part of it is occupied with a wagon shed without sides or roof; in another part of it you find a pile of boards thrown in any shape; if you look around you will see a storehouse for worn-out machinery of all kinds; the rest of it is grown up with grass and weeds. The so-called barnyard could be cleaned up and laid out to driveways and groups of plum trees, having a road around and on most of the sides of the groves; and, especially, should there be a straight road from the house to the barn, so if any one should have to be called from the barn to the house, it would be possible that the person could be seen. One grove could be set out with three rows and three trees in a row, making nine trees. Another with two rows set V shaped with a tree between the two trees farthest apart, making six trees. A third can be set out in a circle with eight trees around and one in the center. A fourth grove can be set hit or miss, and wherever there is room for a tree or two set them if it does not interfere with driveways and the turning around with a team and wagon. The trees should not be set less than eight feet apart and twelve is better. Apple trees, I find, are best set 16 by 16 feet and the ground planted to raspberries and blackberries at the same time. When the trees begin to bear the berries will have done their best; then the orchard should be seeded to grass, and the trees mulched.

The plum trees should be procured in the fall, and, I think, would be better set in the fall. The trees should be bought from the nearest nursery, and, if not planted out in the fall, they should be heeled in and set out in the spring as early as possible, trimming all bruised roots. The kinds I would set most of would be Desota, Weaver and Forest Garden. There may be a few others that are good, but these three kinds will stand the most severe winter. I would set a few seedlings, or such as are called wild trees, for fertilizers. We often find some that are very good.

The Desota is a yellow plum and takes the eye on account of its large size, and it is splendid for canning. The Weaver is a large red plum, and nearly a freestone; the trees will always be overloaded with fruit and break down. The Forest Garden is a red plum not so large as the Weaver and is an abundant bearer. I would also set a few novelties. I have on my grounds the Abundance, Shipper's Pride, Wild Goose and Marianna. The Shipper's Pride is the only one that has proved to be of any value. It is a very large blue plum and very hardy.

The Marianna I like for the splendid appearance of the tree. It would make a fine tree for a city lawn. These trees must be root-grafted, because the cion will grow faster than the stock.

The Desota, Weaver and Forest Garden will make fine trees if grafted into the wild plum trees at any height, but if two cions are put in the same cleft and both grow,one must be cut out. They will never unite and at last will crowd each other and split the stock. Grafting plums must be done before the last of March.

Cultivation.—Now, you will think that I have a job cultivating trees in the barnyard and in such a shape as I have them. But I do not cultivate plum trees, as all the roots that are either bruised or broken will send up a lot of sprouts, and they are nothing but a nuisance. I scatter some manure around the tree and then let out the hens, and they will do the work to the best satisfaction, and when tired they will stand in the inviting shade of the plum trees. And in the balmy mornings of the spring with pail in hand walking through the groves to the yard to strip the cows, you will stop and look at the pretty white blossoms, and while estimating the plum crop, you will hear a sweet voice from the house, "Oh, Gust, when you come back break off a few limbs with those pretty white blossoms, please, that I can put in these vases that have stood with that dry grass all winter."

After the blossoms have fallen and the plum has attained the size of common white beans, you will see the mark of the curculio. It resembles the last quarter of the moon,and it is,also,the last quarter with a good many of the plums. The trees should now be sprayed. Use a level teaspoonful of Paris green to a bucket of water. It should be repeated once a week for three weeks. It has saved a good many plums for me. Apple trees must not be sprayed before the apples are nearly the size of walnuts, as there are more worms enter the apples after that than before.

The best curculio destroyer is a litter of small pigs. If allowed to run among the trees they will eat plum pits, curculio and all. Chickens also are good among the plum trees, but they have to wait for the curculio to come out, and then he is likely to escape.

Plum pods are a fungus caused by warm and rainy weather after the fruit have set.

Plums when nice and ripe are good fruit to eat out of hand. The Desota when canned make excellent sauce. The red kinds make fine jelly. The most of our ladies know how to make plum butter; it will often take the place of dairy butter when scarce and high-priced, and there is no doubt but it is more healthy than oleomargarine.

DISCUSSION.

Mr. Harris: That was an excellent paper, and I see but just one thing or one recommendation that I would not recommend to a farmer, and that is the setting of raspberries and blackberries between young trees, calculating to take them out after they had done their service. The trees will do all right and the raspberries will do all right, but every farmer in Minnesota has a good deal to look after besides his trees, and he does not get time to put down those raspberries, and they make such a nice place for the rabbits to sit under and gnaw the bark off his trees. Another thing, they do not allow a free circulation of air. The balance of the paper is excellent from the farmer's standpoint, and if every one of our farmers could study it, it would do them good.

Mr. Phillips (Wisconsin): He spoke of the sun scald. Here is a tree protector (showing a protector made of lath cut in lengths of about three feet, and fastened at regular distances apart with wire and staples) I have used for years, and they cost about 3½ cents each. If a man is going to plant trees, a farmer or anybody else, he ought to protect them. I keep them on all the year round. They are better than anything else I have ever tried. I do not like to use straw or hay, because it makes a great harboring place for insects. This is the best thing I ever tried. You can make them as long as you like; I make mine about three feet long.

Mr. Brackett: They would not cost three and a half cents.

Mr. Phillips: That is a good estimate.

Mr. Sampson: Do you ever fill with dirt during the winter?

Mr. Phillips: I do not like that idea. I find by following that up that the tendency is to keep the air away from the tree and make the bark is more tender.

Mr. Brackett: I would like to hear a word from Prof. Green on that point.

Prof. Green: I think very highly of the plan of boxing up the trunk of the tree and leaving it there the year round. I believe the trunk will develop in better shape than it would otherwise. I do not believe it makes much difference about the trunk of the tree whether the protection is removed in the spring of the year or not. It has made no difference at all with some experiments I have tried. The trees did not seem to be any less hardy for it. We only commenced it in 1889. I like this lath protection very much indeed. I like the thin

veneer also. I get it in St. Louis. It is cut very thin and when soaked over night becomes quite pliable and can be placed around the trunk of a tree and tied. I pay $3.50 per thousand for it. It is much the same as this method of protection. The air can freely circulate around the trunk, and the protection does not make much difference, so far as that is concerned.

Mr. Brackett: Do you take the dirt away in the summer?

Prof. Green: No, I do not. When I use the boxes I leave it on all the year round. I think it works all right.

Pres. Underwood: What do you put the dirt around for?

Prof. Green: I look at it in this way. We have a severe winter. The tree is liable to be injured by the severe conditions of the winter, and to guard against it, it should have some protection. If the roots are in good shape, it may be able to overcome some weaknesses by reason of climatic changes of the preceding winter, but the safest way is to give it protection. Where a man has only a dozen or two of trees, he can well afford to box them up and keep them boxed. What we use for boxing is boards; two eight inch boards and two six inch boards, and then fill the inside with earth, and on the approach of winter we put a bunch of hay in the crotch of the tree to protect the crotch.

Mr. Dartt: If it will pay with a few trees, why will it not pay with a good many?

Prof. Green: It would be all right, but when a man is in the orchard business he might neglect a good many things. I would recommend it for general practice.

Mr. Pearce: Is there not a certain action taking place during the entire winter between the carbon and the starch which is stored in the cells? Is there not a constant action taking place, and does not the dirt around the trunk of the tree interfere with and destroy that action? Can the tree act with the dirt piled up around it?

Prof. Green: It certainly can act. As for there being some change in the tree in the winter there can be no question but what there is some slight change in the cellular tissue in the winter, but it is so slight that we are unable to detect it; but judging from the course of things, there seems to be a little swelling of the bud between the autumn and spring. As for what you spoke of in regard to the starch and carbon, I hardly understand what you mean, but say to the best of my knowledge there is no cell action in the winter in any way; and in any event the cell action might take place under the soil as well

as if it were exposed. Cell action takes place around the roots as well as anywhere else.

Mr. Pearse: I can cut a whip stock four feet long perfectly green—cut it in the fall—, and in the following spring I find it is dry, and it shows conclusively that something is going on.

Prof. Green: There is no change from starch to sugar. Of course, there is evaporation going on; it passes through the trunk of the tree right into the earth.

Mr. Phillips: Do you think it kills the borers to whitewash

Prof. Green: Where a person is troubled with mice there is no harm in using linseed oil right on the trunks of the trees; I have used glue a good deal on peach trees.

Mr. Philips: I will say I have two trees at home standing alone; one I protected and the other is exposed, and it may be after ten or twelve years I can tell something about them.

REPORT ON APPLES.

BARNETT TAYLOR, FORESTVILLE.

Apple production in this part of Minnesota in 1893 was a mixture of about equal parts of sunshine and shadow. The trees came through the winter of 1892-3 in perfect condition, so far as injury from winter-killing was concerned; even tender varieties were green and sound to the terminal buds. When blooming time came the blossoms were seemingly sparse, but there proved to be enough, and a fine crop of fruit was set, which grew finely until about the size of peas, and we reported the prospect for the greatest crop of apples ever grown on our grounds. But about this time a new danger made its appearance in the shape of a new form of blight, which attacked the fruit spurs of the trees, which died, and the whole of the apples would suddenly wither. This destructive work continued, attacking all varieties of crabs and standards until it appeared at one time that the crop must be almost an entire failure in this region; but in this we were happily disappointed, for some spurs escaped, and there was about a half of a crop of fair fruit matured.

There has been much speculation as to the nature and cause of this blighting of the fruit spurs. Some attributed it to the severe late frosts, others held the cause to be from the weakened vitality of the fruit spurs from winter injury, but none of these theories were satisfactory to my mind. The theory of winter injury was unsatisfory because I know from close investigation that the fruit spurs were the soundest from winter harm of any year in my experience; late freezing was unsatisfactory because in the several cases on our grounds, the most exposed trees and tenderest varieties were injured the least; and to charge it to the disease termed blight, in the ordinary understanding of that disease, is not sustained, because the young growth is the part affected in that complaint, the fruit spurs

being only affected in a general way by the branch dying below them. For myself, I have arrived at no settled conclusion in regard to the cause. I had some Minnesota crab trees near the house that promised for a time to escape, but later they, too, were affected, and on those trees I made careful observations. The Minnesota is a hardy tree and the wood was entirely sound, which argued against the winter harm theory, and the trouble did not appear until all late freezing was over. On these trees the first injury showed on the side where the morning sun struck the trees, and far the greatest harm was on that side. However, there were many spurs that entirely died on the opposite side from the morning sun.

The present condition of apple trees in this section is good. Notwithstanding last summer's exceptional drouth, trees made a fair growth and ripened the wood extremely well; and I have noticed that trees that bore a full crop last year are well filled with fruit buds, and this promises a good fruit crop for 1895. The late Joel Shearman of Rockford, Ills., told me many years ago (about 1867) that that part of Fillmore and Houston counties along the Root river from our place to the Mississippi river, would yet be a great apple producing country; and I now begin to realize the truth of his prophesy, for there are already thousands of barrels of apples shipped from this section each year—the one point, Spring Valley, sending out 2,000 barrels in 1892. After thirty-five years' experience, I have faith in raising apples, and we still continue to plant orchard trees, the Forestville Fruit Farm having some 3,000 trees in orchard. There are many promising new seedling apples in bearing in this neighborhood, but none of them have been tested sufficiently to warrant recommending them.

In this matter of recommending new varieties we should be extremely careful, for my greatest losses in apple culture have come from planting much praised (by the nurserymen) kinds which failed to stand our severe climate. As to new varieties I know nothing new that can be recommended, from actual experience, over the old tried Duchess and Wealthy. The Peerless is being planted largely here, and the trees planted here look extremely well, but its fruiting qualities are yet to be proved. I expect to have this variety in bearing next year, and hope much from it.

I regard the operations of a lot of shark tree agents in this section as a great injury to apple culture. There has been a party of these frauds, as I believe them to be, operating in this section of Minnesota. They claim to represent a Dayton, Ohio, nursery, and they sell what they term "a model orchard." They recommend several new apples with big names, and all their orders for grapes are classed under the vague title, "wine grapes," which, of course, allows them to deliver any variety of grapes. I understand they charge eighty dollars for these model orchards, and verbally agree to care for them for three years. They induce the local papers, or some of them, to tell their readers that with these model orchards they will have, at the end of three years, a splendid lot of sound, healthy bearing trees. This winter they are here again under pretense of pruning the trees set last spring and are canvassing the country for new

victims. The stock they furnish can be bought of reliable nurseries for one-third the price they ask, and of tried kinds. They find many customers among that blind, greedy class that cannot afford to send fifty cents for a year's subscription to a good agricultural or horticultural paper.

I will close this paper by quoting from an address of Professor C. V. Riley, late entomologist of the United States Department of Agriculture, in regard to the important part bees play in apple production. After mentioning the twenty million dollars worth of wax and honey produced by the 300,000 beekeepers in our country, the professor says: "The service directly rendered to man by bees, however, in supplying the products mentioned, is but slight as compared with the service indirectly rendered by cross-fertilization of our cultivated plants, and it has been estimated that the annual addition to our wealth by bees in this direction alone far exceeds that derived from honey and wax. One of the latest discoveries bearing on this subject, very fully enforcing the general principle, was presented to the society for the first time within the past year by our fellow-member, Mr. M. B. Waite, as a result of his investigations for the division of vegetable pathology in the Department of Agriculture. He has proved that a majority of the more valued varieties of our apples and pears are nearly or wholly sterile when fertilized by pollen of the same variety or that they bear fruit of an inferior character and very different from that produced when cross-fertilized; further, that were it not for the cross-fertilizing agency of bees, scarcely any of these fruits could be produced in the abundance and perfection in which we now get them, and that to secure the best results and facilitate the work of the bees, it is yet necessary, in the large majority of cases, to mix varieties in the same orchard."

REPORT ON APPLES.

D. F. AKIN, FARMINGTON.

The report of your committee on apples for the year 1894 will of necessity be brief. Many of the apple trees in Dakota and some of the adjoining counties put out more than the usual amount of bloom; in fact, in many cases the bloom was excessive to a remarkable degree, trees literally white. Before the bloom was gone a frost came that appeared to stop the fertilization; so but a few of the trees started with their usual quota of fruit. The early part of the season, that is, May and June, was wet till June the twentieth, when a very severe and quite extensive hailstorm destroyed many apples that were doing well till then. Now commenced a severe and peculiar drouth, which caused many of the remaining apples to drop from the trees before maturity.

To increase the destruction of the apple crop a greater blight than ever before showed itself, and on trees not before affected by it; for instance, some Hibernals were completely destroyed. All the apple trees suffered more than ever before. With all the drawbacks of the season of 1894 there were some fine displays of apples at the county fairs, and taking the numbers of young trees that are being set out each year as a criterion, I hope that the future reports on the cultivation of apples will be more encouraging each year.

APPLE TREE SEEDLINGS.

CHAS. F. GARDNER, OSAGE, IOWA.

To a large class of readers what I shall say on this subject will be of little interest, as the facts which I present have been well known for a thousand years. Then, you ask, "Why present these facts which are so well known?" The reason why is this: Because a gang of men can go out through the country and represent that they have an apple tree that in flavor surpasses the Wealthy and as a keeper will last from six to eight weeks longer, a perfectly hardy tree, as hardy as the bur oak, for the reason that this wonderful tree has never been grafted or budded. They represent that all methods of budding or grafting to propagate apple trees is a complete failure, as it is certain to cause premature decay and death. The acme of perfect success, however, has been found in a first-class apple that needs no grafting nor budding; it reproduces itself from seed with invariable and absolute certainty.

This tale, well told, was listened to and accepted by thousands. Not only farmers, but editors, medical men and lawyers, who listened with gaping mouth and readily gave their orders for this wonderful tree at the rate of one dollar or more each. When this can be done and thousands of dollars worth of orders taken, is it not time to take this matter up and make a statement of facts for the benefit of those who are not posted on the subject? It is a matter of surprise to me to find so many persons who know little or nothing concerning this subject. What are the facts?

If there is anything well known, any fact undisputed among horticulturists, it is that, as a rule, no tree fruit will exactly reproduce itself from the seed. While this is true of all tree fruits, the apple tree is remarkable in that valuable varieties never reproduce themselves. The only cases known in pomology where an apple tree is produced the second time from the seed is in cases where they revert back or nearly so to the wild stock from which they originated. Pyrus malus, and all such trees are absolutely without any value whatever except to be used as stocks or for wood. There never has been but one Rhode Island Greening grown from the seed. Other Greenings have been developed, but never one like the original. This is true of all other named varieties of the apple.

Plant a bushel of apple seed, all taken from the Wealthy, while it would be possible, still it would be highly improbable, that out of the whole lot of seedlings you would get a single Wealthy apple tree. This is true of any given named variety. The real, absolute facts are, technically speaking, that in planting the bushel of apple seed mentioned, when the seedlings are grown there will be no two trees that are exactly alike in every respect, and, what is more, there will be no tree that is exactly like any known tree heretofore grown, with the exception of those which revert back to the original stock as before stated. Many valuable varieties will be found among them, but all differing in some way from kinds now known and classified. Consequently, to perpetuate a given variety, grafting or budding in some form must be resorted to.

Grapes.

REPORT ON GRAPES.

C. W. SAMPSON, EUREKA.

The grape crop around the shores of Lake Minnetonka was a good average crop. The season was early all the way through. The vines put out early in the spring and continued about two weeks ahead all the way through. Although we had an extremely dry season I could not see as it did much damage to the grape crop. The grapes may not have been quite so large as common, but they ripened in fine shape and were of a delicious flavor.

I visited Mr. G. W. Jones' vineyard and found it in very good shape; the Moore's Early were getting ripe and were shipped to market on August eighteenth and twentieth, and were perfectly ripe. The Delaware were ripe August twenty-eighth and were of very fine flavor. The Iona were a light crop, as the mildew of two years ago nearly killed them, but I saw some very large fine bunches.

The next vineyard visited was Prof. H. W. Malcolm's, and this was the most perfect in culture of any that I visited,and bore a splendid crop. I next visited the small vineyard of Mr. A. D. Leach, on Lake Minnewashta, and here I saw some model vines and in perfect condition. I think Mr. Leach could give us grape growers some valuable suggestions as to his manner of treating vines. I noticed that he had his grapes well thinned out and all the bunches were large and of a uniform size. He had one Delaware vine that bore from two-year-old wood sixteen small baskets of grapes. If we could make a five-acre vineyard bear like this one there would be a small fortune in it.

I next visited Mrs. S. Irwin's vineyard, and here also found a splendid crop of growing grapes. The vines were in excellent shape and looked healthy and vigorous. I believe this vineyard was not injured by the mildew of two years ago, as she was one of the fortunate ones who sprayed their vines thoroughly. Mrs. Irwin has a five-acre vineyard containing some 3,000 vines, situated on Christmas lake, Minnetonka being on the west side. I understand that she harvested and sold from this vineyard two years ago $1,500 worth of fine grapes.

Mr. H. L. Crane's vineyard was also found to be in excellent condition,and it ripened a fine crop of grapes. Some of the choicest grapes found in the Minneapolis market come from this vineyard. I think Mr. Crane will agree with me that there is still a very handsome profit in growing grapes on the shores of Minnetonka.

On my own place I have about 6,000 vines; about 3,000 were in bearing the past year, and I picked and sold 4,000 small baskets of grapes. The grapes were of good size, and I never tasted sweeter or finer flavored grapes than those grown this year. The dry weather did not seem to affect them in the least, in fact they seemed to thrive

through it all. My soil is a sandy loam with heavy, clay subsoil. Had it not been for our grape crop, some of us would have fared pretty slim the past year. I have one vineyard lying directly on the south shore of Minnetonka that ripens its fruit at least one week earlier than any vineyard I know of. I commenced shipping Moore's Early from this vineyard August eighteenth and Delaware August twenty-first. They were all ripe by September eighth and ready to put on the market. These early grapes, of course, brought a good price, selling at from twenty cents to forty cents per small basket. With what little experience I have had in the fruit business, I would rather take my chances in growing a crop of grapes than I would any other kind of fruit, and I like the work better.

We are troubled some with what we call the grape louse. They are a small green-looking insect on the under side of the leaf and will sap the leaf so that it becomes dead in spots. To kill this louse I sprinkle air-slaked lime on the vines and throw it up under the leaves as much as possible. We were also troubled some with the leaf hopper on the leaves in the fall about the time the grapes ripened, and I would like very much to find some remedy to exterminate this hopper.

DISCUSSION.

Mr. Wedge: I would like to ask Mr. Sampson what the slope of the ground is where this vineyard is located.

Mr. Sampson: It is high ground; it slopes directly south towards the sun.

Mr. Wedge: Is it a steep slope?

Mr. Sampson: Not very, but quite high; the soil is sandy.

Mr. Brackett: The lake is on the north side of the slope?

Mr. Sampson: Yes, sir.

Mr. Wedge: Do you find the Moore's Early a favorable bearer?

Mr. Sampson: I always found it a light bearer, but the last two years I have been experimenting, and I have got them so they give me a fair crop, as good as the Delaware.

Mr. Crane: What is the nature of that louse you spoke of? What is it like?

Mr. Sampson: It is a little green insect; looks like a louse. You will find it on the under side of the leaf.

Mr. Crane: Do they move very much?

Mr. Sampson: No, they do not move much; they are different from the hopper.

Mr. Brackett: Is any one else troubled with this louse in your neighborhood?

Mr. Sampson: Mr. Leach has them in his vineyard. Mr. Leach is here; perhaps he can tell you more about it than I can.

Mr. Leach: I have been raising a few grapes for about twenty-five years. I have never raised a great many, but I have taken pride in and taken care of what I have. In regard to this louse, it has been quite troublesome for a number of years. My vines are near the lake, on a south slope, and back of them is a row of Lombardy poplars and red cedar. The poplars are about seventy-five feet high, and the red cedar about fifteen feet, so the vineyard is protected from the northwest winds. The little insect that lays the egg which produces this louse is a small drab-colored miller. It comes on the vines about the time they blossom, and they settle on the leaves very thickly. I began to experiment to put a stop to their work some five or six years ago. I tried a good many things, but what succeeded best was air-slaked lime. I would take some and throw it on the under side of the leaves, and that has kept the louse off the leaves better than anything I have used. They will not move on the leaves, and by just looking at the leaf casually you would not think there was anything there, but if you touch the leaf with your finger, they will move along. It appears as a sort of a brownish spot on the leaf, and when you touch it, it moves and you can then see it is an insect, but before that my eyes would not have detected it as an insect. They suck the sap out of the leaf, and it finally dies, and later in the season a great many leaves will fall off. I think they have been worse on my vines than they have been anywhere else, and I thought it was because by vines were so much sheltered. Another thing about raising grapes; I have experimented in cutting away the old wood and starting a new growth. I think it is a great benefit. After the vineyard has been set about ten years the wood becomes hard and unpliable, and by taking a little pains at the start you can start a bud near the ground and let it grow a year on the old wood and raise your crop just the same, and if it does not thrive well enough let it remain the second year, and the third year cut the old wood entirely away, and you will get a larger crop of fine grapes from that two-year-old wood than you ever got from the old vines.

Mr. Crane: This insect—how does it move? Does it hop?

Mr. Leach: It just crawls along. That is another insect that hops.

Mr. Crane: I would like to hear what Prof. Green has to say about that insect.

Prof. Green: I think what Mr. Leach has said covers the ground pretty well. It must be a louse or something of that

sort from the fact that the eggs are laid by a miller. I have never seen it here.

Mr. Leach: I did not carry the description of the insect quite far enough along. This louse finally develops into a fly, and when you go through the vineyard and hit the leaves it flies in your face.

Prof. Green: That is the way with all the family of aphides. They have a wing stage. This leaf hopper has given us considerable trouble at the experiment station, and we have fought it, but not very successfully, but we have not much to complain of compared with other parts of the country. I was in Kansas last summer, and it is a beautiful country. They have very nice vineyards there, and while I was there they were watering the vines trying to keep life in them. On the same ground the Mississippi Pippins were ripe and falling off the middle of August. The drouth was so severe that the winter fruit was falling to the ground. The vines there were terribly afflicted with the leaf hopper; I never saw them worse; the leaves were almost straw colored. I asked Prof. Mason: "What do you do for them?" He remarked that they were not so bad this year as they were some years, but the damage they were doing was somewhat surprising to me. The method of destroying them which they found most successful was to make a sort of a sled, stoneboat fashion, with a frame on covered with cloth projecting out from the sides. The cloth was saturated with kerosene, and they would drive between the rows and whip the the vines as they went through; the leaf hopper would strike against this cloth covered with kerosene, and it would kill them. We tried kerosene, and we could not keep them in check. One way to keep these insects somewhat in check is to destroy or burn any rubbish that accumulates around the vineyard, which will greatly reduce their number. If you burn up any old trash or rubbish you have around the place, it will destroy a great many of the hoppers.

Mr. Wedge: I would like to ask Mr. Leach if protection from winds from any particular direction, north or northwest, is desirable for a vineyard?

Mr. Leach: I think it is. I do not think it is desirable so far as insects are concerned, because I think a good breeze will blow the insects away. But if the vineyard is protected I think the grapes will ripen earlier, and I think it is desirable for a good many reasons.

Mr. Wedge: Do you mean protection on all sides?

Mr. Leach: No, I mean on the north and west sides. If you have north and west protection you will find the place distinctly warmer.

Mr. Wedge: If your lake is to the west, would it be desirable to put the protection there?

Mr. Leach: The lake is on the east; if it was on the west I would not need the protection.

Mr. Wedge: You would not think it desirable to have it protected on the lake side?

Mr. Leach: No, I do not think it would be desirable; I don't think it would be necessary.

Mr. Wedge: Were those poplars you spoke of set out with a view to protecting the vineyard?

Mr. Leach: No, the protection my vineyard has was not set out for the purpose of protecting it. I never had a vineyard that did not have protection from the north and west. I think I have as good a vineyard as any vineyard in the country, but perhaps I have given it more attention than other people do, that being my principal business—to look after my fruit and vines, and I ought to know pretty well by this time how to take care of them. Perhaps, that is one reason why I get such good crops.

Mr. Pearce: I want to speak a word in regard to protection from winds. I have grapes in all kinds of positions to experiment on in regard to windbreaks. On the west I have a heavy growth of very heavy timber. I have three rows of grapes twenty rods long. Forty rods east of that I have the same number of vines, and they are clear away from the timber, windbreaks and everything else. I have another plantation on the south side of a hill; there is no timber within thirty rods of it. I will say this, that those rows on the west part of my vineyard nearest to the grove are always much later than they are in either of those other places, at least ten days later. Those that are growing where they have the wind from all directions are at least five days earlier than any other. I have also noticed this, that when the wind blows the grapes ripen much faster than when it does not blow. When we have no wind—I have watched my grapes very carefully—there seems to be no ripening at all, but when the wind blows a good, stiff breeze everything jumps; and I have arrived at this conclusion, that it is much better to have no windbreak around your vineyard at all.

Mr. Phillips (Wisconsin): When the wind blows almost like a hurricane does it have a good broad sweep over your place?

Mr. Pierce: I am about a half mile from the lake, and the wind has a good sweep. Those grapes with no wind protection are always the best. I might carry this thing further and say that the wind promotes growth on everything that grows. Without wind I do not think we could grow anything.

VINE GROWING FOR PROFIT.

H. L. CRANE, EXCELSIOR.

I make grape growing fairly profitable the way I manage it, but try to make and do everything in the quickest, most economical and best way possible, even if I have to break away from established customs, but admit that I make mistakes and waste time. I began raising grapes in a small way nine years ago, and now have four thousand vines, besides having several acres of currants, berries, apple and plum trees.

When I began growing grapes it was the custom to dig with hoe or shovel the trench to lay the vines in for burying in the fall. That seemed time thrown away, and after the first year's experience I furrowed the trench for laying them in, but soon found it was necessary to have the trellis wires strung on the upper hill side of the posts, for you have to lay the vines down on the same side of the posts as the wires, and on the upper hill side there is more dirt above the roots, so in this way you can make a good furrow to lay vines in. The last time I plow my grapes in the summer, I throw the furrow toward the vines, making the dirt near them higher than between the rows. Before I begin to lay the vines down I plow one or two furrows toward and close to them, making a quantity of loose dirt to pull over the vines; then I put the vines in the trench, hold them down with both feet and pull the dirt over them with a broad hoe, similar to those used by masons to mix mortar.

In the spring, when the ground is the softest, remove rotten posts and put in new ones, it being a small matter to drive posts when the ground is watersoaked. I take my vines up the first of May—think they should be taken up that soon so the fruit will ripen early, and there is but little danger of frost on high land after that date. A number of us have made mistakes in planting some of our vineyards on low ground, which is work, time and money thrown away, I think; the fruit is not sweet, and it is liable to frost, also, on low ground.

Standard varieties of grapes, such as Delaware and Concord, are the best to set out to any great extent, as people prefer to buy only the ones that have a reputation. I have Brighton, Iona and several other kinds of a better quality than Concord, and can sell them to but few customers, while Concord and Delaware are the ones that every dealer wants.

One thing I would like to mention right here, which I think injures the reputation and profits on grapes in our locality, and that is the selfish and short-sighted custom of some our growers in picking their grapes early and sending them to market before they are ripe. People buy them and don't like them,—"Minnetonka grapes

are too sour." It thus lowers the price and injures the reputation, and those that pick their grapes in the proper season are the principle sufferers.

Now, as to giving an accurate statement of the profits on my vines, I can't give it, for my time and my help's time is engaged at other work a good part of the season; but according to my best judgment I think I make four hundred dollars above actual expenses, besides getting paid for time in a healthy and wholesome occupation. Grapes, I think, have been very cheap for the last few years, and whether they are ever going to be higher is a question yet to be solved, but don't believe they will ever be lower.

At your honorable body's talks and discussions at your regular meetings on the various fruits for Minnesota, I see that apples get the lion's share of attention, and, as a consequence, being very much attached to the grape, feel jealous, as the latter is one of our finest looking as well as tasting fruits, and considered by good authority as one of the very healthiest and capable of sustaining life alone. And not only that, but some varieties are good keepers, as I have here on exhibition, the eighth of January, grapes that will keep six weeks after this, if necessary, and in good repair; and they were kept in my cellar, too, but the cellar is dry and cool. Grapes can be kept in loose, open boxes or the bunches put in small paper sacks, which cost only seventy-five cents to a dollar per thousand. To be sure, not all varieties are good keepers, but the Iona and Duchess and some of the other kinds, Rogers, etc., are good keepers. Now, I have been eating grapes of my own raising for nearly five months, and it is so every year—no failures like there are in apples, for I have not missed a crop yet by failure, while you are continually running up a stump (apple tree stump killed by frost.) The fact of it is, gentlemen of the apple tree persuasion, I should advise you to come to us grape growers for points on winter protection; for my part, I came to the conclusion several years ago while listening to your discussions, that a good way to treat your trees would be to put a strap hinge, well screwed on, just at the base of the tree, and then saw it off just where the strap's hing is, and your tree will lop to the ground and up again with very little exertion—like a barn door opens and shuts, for instance; then cover with marsh hay or straw—either will do—but don't fail to put a little strychnine mixed in with corn meal under the hay or straw to kill the mice and permanently injure the tree. As I have not had long experience in this mode of treatment, it might be wise to begin on some tree that has borne its last crop.

Thinking I may be wandering from my text, and your valuable time short, I will close my advice on apples, that you will have more time to devote to its discussion.

DISCUSSION.

Mr. Phillips: How would that apple tree do for a trellis for your grapes after you had turned it down?

Mr. Crane: It would do very well, I think. I had not thought of that. Thank you. (Laughter.)

Mr. Pearce: I would like to speak about two minutes. There is one subject that every commercial grape grower should study and think about, the low price of grapes. It is a lamentable fact that we are getting nothing for our grapes, and I have wondered a great many times why the grape growers all over the country could not form a combination. We have combinations formed in everything else almost. We have a combination in sugar, in oil and many other things, and why could not the grape growers form a combination? We are large commercial grape growers. This is a matter we want to bring before the commercial grape growers of Missouri and Iowa, and all over the Western states. to form a combination in a business way. We want a good price, and we could in that way sell our grapes so we could realize some profit. This is a subject worthy of your careful attention, and I would like to have a committee appointed and give them some authority in this matter, and, may be, we can have a general convention to talk this matter over.

Mr. Clark: I have a quarter section of land up in North Dakota. It is surrounded by a strip of trees four rods wide, all around the outside. I would like to ask the grape growers here, especially this gentleman here who has had such good success, if it would be possible to go into the business in North Dakota? It is a dry country, very cold.

Mr. Crane: The main question would be whether it is subject to early or late frosts. On the prairie there is usually air stirring which tends to keep the frost off. I have had no experience on prairies; I do not know.

Sec'y Latham: I would advise Mr. Clark to correspond with E. W. Hazeltine, living at Grand Forks. He could answer the question intelligently.

Mr. Gould: The only safe way would be to try that thing lightly. I think the chances are that grapes would not be very much of a success in that region.

REPORT ON GRAPES.

WM. WACHLIN, FARIBAULT.

Grape growing in Minnesota is past the experimental stage; it is an established fact, especially in the southern half of the state. Of course, there are localities more favorable than others. An elevation with slope east and south is always preferable to any other slope or level ground; yet, any good soil will produce grapes in abundance. Most farmers and many who live in villages or cities who own a lot or two can raise all the grapes they can use in their

families during the grape season, and put up grapes in various ways for winter use.

Many people believe and have been made to believe that grape vines are very difficult to manage, that the vines are not hardy enough to endure our climate and that it is a very difficult matter to plant them. Many have not got over the old idea, that they must dig a deep trench to fill up with old boots, bones and other rubbish to plant their vines on, and as they don't take the pains to learn better by paying $1.00 and becoming a member of the horticultural society, they don't know what is going on in the line of growing grapes and other fruits in Minnesota. Of course, a good many buy a basket of grapes now and then during the grape season, but they lose all the enjoyment of going into their garden and picking their own grapes.

Many farmers imagine they have no time to waste on either garden, grape vines or other fruits; and, incidently, let me say right here, more than half the farmers lose half their living by not having a good garden with plenty of the different varieties of fruits and an abundance of grapes in it. In Rice county are not nearly as many grapes grown as there ought to be; in fact, the number of farmers and others that grow them are very few, and as grapes are shipped in and sold pretty cheap, a good many people think they can buy them cheaper than they can raise them.

I am not a professional grape grower at all—I have only grown a few vines in my garden; but I have found out by experience that grapes can be grown here, even if we have not the most favorable surroundings. I am located on the flat part of our city, where we are more exposed to late and early frosts by two to four degrees than other more elevated parts; but at the same time I have lost my entire grape crop in two seasons only out of about twenty since I commenced planting vines. This year, 1894, the frost on the morning of May nineteenth killed all my grapes, for which I partly blame the signal service, as they did not report any frost the day before, and so I did not take the precautions I might have taken if the officers had done their duty. So I had to do this fall as most of my neighbors did; that is, buy a few baskets of grapes; but we had very little satisfaction out of the operation. There are a few parties near here, on more elevated ground, who raise grapes, where the frost did not strike so hard, and they had a fair crop. But I am not discouraged. While my vines were injured by the frost, they are in pretty good condition for another season. Of course, when the first growth of a vine is cut down by frost it makes a good deal of trouble and extra work, because where the first bud or shoot is killed by frost, invariably two or more dormant buds start to grow, all of which except one have to be rubbed off, which is no small job where there are a good many vines to look after.

In regard to vines for planting, I like good, strong, two-year-old vines, as I have found them the most satisfactory. The young vines should be cut back to two or three eyes. In planting, the vines should be set in a slanting position; this is very essential, as it lessens the liability to injure them in laying them down for winter

covering. The vines should be planted in rows running north and south where practicable (although a friend of mine near here has a fine patch of vines the rows running east and west, and he has very good success with them). They should be planted seven to eight feet apart in the row, and the rows about eight feet apart.

A good clay soil is preferable to any other, and the soil should be thoroughly worked to a good depth and made rich with good manure. Care should be taken to have no manure come in direct contact with the roots of the vines, as it is liable to injure them. Grape vines are great feeders and so the soil must be rich to give the best results. (I am speaking of planting on a small scale, as that is all I have had experience with.) Of course,the ground must be kept in good cultivation and free from weeds during the summer. In the fall after the frost has killed the leaves, I cut my vines back to two or three eyes, that is, this year's growth.

I am much in favor of summer pruning, as it keeps the vines in much better shape, instead of letting them have their own way and run all over. In my early experience I let them grow without summer pruning, but I am much better satisfied with the present practice of summer pruning. My method in summer pruning consists in pinching of the tips of the young shoots after they have grown about four leaves beyond the last bunch of fruit, that is, I leave three or four leaves from where the last bunch of fruit is formed. The pruning must be done as soon as the shoot is long enough. because if the vine is left to grow to a considerable length and then cut back, it is an injury to the vine, as it checks the growth too much at once. I don't favor as close pruning as I have seen some do. When a shoot is nipped, of course the bud at the last leaf will start and make a new shoot, which must again be pinched off after the first leaf is formed; and if a real good job is desired, that pinching must be continued through the summer. It makes the vines very stocky and they invariably ripen the wood much better for next seasons use than where the vines are left to grow without pruning.

I object to trimming off the leaves as I have seen some do, in order to have the sun shine directly onto the fruit, which is not only not necessary but it is an injury to both fruit and vine, and I think really retards the ripening of the fruit. Another advantage of summer pruning is that it prevents the liability of too much shade, especially in wet seasons.

Winter protection is an important matter. I think soil is the best material for covering. I dig a shallow trench along the row as close to the vines as is practicable without injuring the roots, then I bend my vines down into the trench. This is very easily done if the vines have been set slanting,as mentioned before. Then I cover with soil. It is especially necessary to cover the lower part of the vine next to the roots thoroughly, as in bending the vines the bark may be strained some, especially in old vines,and, so, if that part is exposed to drying winds and sunshine,it is liable to injury. In the spring I always leave my vines covered as long as I can to keep the buds from starting too early.

I have not been troubled much with mildew. A few of the vines of my first planting mildewed badly. I dug them out and planted others in their places; since that time I have not been troubled very much. Of course, some varieties are more subject to mildew than others, and as the list of vines to select from is large it is not hard to find a sufficient number of good and fairly healthy vines to suit almost any one. Some of my favorites are Moore's Early, Worden and Concord. I would not plant many Concords; I like the Worden better, and I think it is of better quality and it is earlier, which is a great deal in its favor. And I like the Delaware and Brighton; the Brighton is a very fine grape and bears very fine bunches. The Lady is a very good white grape. I have the Pocklington and Niagara, but I don't think much of either of them. A few years ago I got a few vines of the Green Mountain, and from what little I know of it in the limited time that I have had it, I am well pleased with it. The bunches are very compact, the berries rather small, similar to the Delaware, and the quality is good. It ripens early, and the vine seems vigorous and healthy. Of course, there are a great many good varieties, but I think it is not advisable to plant too great a variety.

REPORT OF COMMITTEE ON ENTOMOLOGY.

J. S. HARRIS, LA CRESCENT.

INSECTS IN SOUTHEASTERN MINNESOTA.

Insect of some species were more plentiful and damaging to the horticulturist in 1894 than in the preceding year; especially was this the case with such as feed upon the cabbage family. The cabbage crop was very seriously injured by the European cabbage caterpillar larvae, of the Pieris rapea (Linn.). They made their first appearance very early in the season, and at least three broods of them were perfected. The hot, dry weather seemed favorable for their most perfect development, while the slower growth of the plants place them at a disadvantage for resisting the attacks. There was also a noted scarcity of the parasitic insects that usually prey upon them, such as ichneumon flies, black wasps and dragon flies. The best remedy we know of for the cabbage worm is the pyrethrum powder, viz: one pound mixed in four pounds of flour, dusted over the plants when wet with dew. As is often the case in dry seasons, the cabbage aphis (Aphis brassicae) was also very troublesome. It infests the under side of the leaves and has a whitish, mealy appearance.

The potato beetle and their larvae were much more numerous and destructive than in the preceding year, and the farmers say it required closer watching and more frequent spraying with Paris green than usual to save the crop. I saw on my place more of the beetle than common, and one day the larvae were so numerous that I feared that I should have to follow the example of my neighbors and give them a dose of green, but, happily, at this juncture the rose-breasted grossbeaks, that were rearing their young in adjoining apple trees, friendly soldier bugs, lady birds and other parasites came to my

aid, and the result was that not a hill of potatoes was seriously injured, and no Paris green or other poison was needed.

In the early part of the season, the codlin moth did not appear to be very numerous and the June brood of worms in the apples were so scarce that the usual precautions were not taken to prevent a later supply, and the consequence was that the apple crop being unusually light, in the late fall .there was scarcely a specimen to be found that did not contain a worm, although they did not show it until considerably later than usual. The apple gouger got in his work as usual, and unless some practical method can be discovered for trapping or heading him off, we must abandon all hopes of raising smooth, fair apples. Spraying for them is of little use; jarring the trees and catching them on a sheet spread under is one of the most effectual means we know of for getting them out of the way. A portion of our orchard is in grass, which was not removed at the proper time on account of scarcity of help. Late in the fall fire ran through it,burning all the grass,leaves and refuse. Some of the trees were considerably injured, but the fruit was almost entirely free from the marks of the gouger and, also, less affected by the codlin worm. Two or three trees standing in the cow pasture also were more exempt than others in the main orchard. Clear cultivation, removal and burning of all rubbish and keeping hogs in the orchard at certain times, all act as safeguards against the increase of insects of this class.

Another class of insects that appear to be on the increase is the bark louse, or scale. Our state has always been a favorite place for disposing of rubbish that accumulates in some of the nurseries of other states. Reliable nurserymen do not do a business of that kind, but bogus nursery firms and tree pedlers purchase such stock at low prices, and sell to our farmers at exhorbitant prices very ordinary trees that are often infested with insects and disease. The scurvy bark louse and the oyster shell are in the state to some extent, but, probably, not doing much damage only on stunted, half dead trees of varieties that are of doubtful hardiness. They do not thrive on healthy, vigorous trees that are well cared for. There is great danger of the worst of all these insects, the San Jose scale, being introduced by the purchasing of apple, plum, apricot and pear trees brought in from infected districts. The U. S. Dept. of Agriculture,has sent out warnings to our pomologists to be on guard against this pest, of which there is considerable danger of its being introduced. If it should once become permanently established here as it has in California, it would cost a few hundred thousand dollars to fight and rout it out and we want to bear in mind that we live in a state where fruit growing is not one of the leading industries and that,for that reason, it is difficult to get legislative aid in the interest of horticulture. I quote from "Insect Life," a journal published by the U. S. Dept. of Agrculture, the following description of the trees infested with it. "During the summer it is noticable that the scale has a tendancy to infest only the extremes of the trees or the new growth, especially of the lower branches and the fruit. The leaves are attacked along the midrib of the upper sides of the leaf in one,

two or more quite regular rows, also to some extent along the side ribs. The infested leaves turn purplish brown but do not have a tendancy to fall. When occurring upon the fruit, the scales have a distinctive peculiarity in that they are invaribly surrounded by a purplish discoloration of the skin of the fruit, and this discoloration is also noticed to some extent on the young, growing twigs. The cambium layer of the wood beneath the scale is stained purplish to some extent. In winter the scales upon twigs are difficult to distinguish. They lie close to each other, frequently overlapping, and can only be distinguished with a magnifying glass. The general appearance which they present is of a grayish, very slightly roughened, scurvy deposit. The natural, rich, reddish color of the limbs of the peach and apple are quite obscured when the trees are thickly infested, and they have then the appearance of being covered with lime or ashes. When the scales are crushed by scraping, a yellowish, oily liquid will appear, resulting from the crushing of the soft, yellow insects beneath the scales."

Both the round and flat headed apple tree borers are occasionally found in this part of the state and more are being introduced in nursery stock from other states. They will, if left alone, soon prove a very serious pest. All trees received from nurseries should be carefully examined for them before planting out. The presence of the larvae can generally be detected by a discolored, deadened or punctured patch of bark above the roots or by the powdery excrement thrust out of the crack or opening where they have entered. The insect should be promptly probed or dug out and the wound covered with grafting wax before the tree is planted. It is said that a few drops of kerosene turned into the orifice will find its way to and destroy the grub without any injury to the tree; I have not tested it. Keeping trees clean, healthy and thrifty is among the best preventatives. Also, washing the trunk of the trees with a strong solution of soap or kerosene emulsion in June and July will destroy the larvae before they have penetrated through the bark.

For a number of years the currant worm had been a serious pest, but for some reason they were not nearly as numerous last year and have done little damage. On my own place, but one infested leaf was found. The year previous we used hellebore and hot water freely. I think that for a few bushes in the farmer's garden, the hot water remedy surpasses all others. To apply it, the bushes must be kept clean from weeds or grass and the suckers cut or pulled away from the base. Then have ready a pot of boiling water, beat the worms from the bushes with a cane or stiff rod; they will all fall to the ground; then apply the water with a garden syringe or through the nose of a watering pot.

Last fall we received from Carver county a root of native plum containing a borer which we were not able to identify. The specimen was forwarded to Professor Lugger, who also could not identify it in the larva state. If any of our members should find them in the roots of plum trees when digging this spring, no doubt Professor Lugger would be glad to secure specimens in the wood, and by observing there transformation, could locate them.

ANNUAL MEETING OF THE IOWA STATE HORTICULTURAL SOCIETY, 1894.

WM. SOMERVILLE, VIOLA, DELEGATE.

Mr. President, Ladies and Gentlemen of the State Horticultural Society:

As a delegate to the Horticultural Society of Iowa, that met at Des Moines on the eleventh of December, 1894, in the Cycling Club hall of that city, I herewith give you my report. Only sixty or seventy were present, but the lack of numbers was made up in interest and enthusiasm. Everybody had something to say worth saying of practical interest, for all were workers. Questions and answers followed each other in quick succession, and not a word was lost.

The opening remarks were made by Mr. A. F. Collman, of Corning, the president of the society; and they were cheering and encouraging. He said that the fruit crop had been a short one, but we had much to be thankful for, and that the prospects were bright for the coming year. There were representative delegates present from every part of the state. The opening prayer was made by the Rev. Frisbie, and he was made an honorary member.

Mr. F. M. Powell, of Glenwood, made an interesting report for the third district. He said that Mills county produced from twenty-five to forty per cent. of an average crop of apples this year. The extreme drouth caused the fruit to fall before reaching maturity. He spoke of one orchard in particular, belonging to Mr. James Record, that had apparently escaped the drouth, he having raised 5,500 bushels of apples on thirty-five acres, with a net profit of $2,500 The orchard was sheltered on the north, south and west by heavy timber, which had the effect of moderating the hot wind so that it did not have the same effect on that orchard as it did on others more exposed. Another orchard was reported in Potawatamie county as yielding a large crop of apples. Owing to three or four applications of Paris green, Capt. Bacon, on a forty acre orchard in Harrison county, raised 7,000 bushels of apples. Audilon county reported a high percentage of apples, cherries and plums, but the small fruits were almost a failure in many localities, in consequence of drouth. After discussing the papers at some length, the conclusion was reached that the drouth was the cause of the partial failure of strawberries, raspberries and blackberries. Grapes were not injured by disease this year as usual, but were a good crop.

Mr. Green, of Davenport, said he was convinced for success in small fruit growing, not excepting the orchard, that shallow cultivation throughout the growing season was the only means of sucsess. A motion to adjourn was in order.

At half past one we met on time, and I then presented my credentials. A motion was made to receive me as an honorary member, for which I thanked them for the honor conferred.

They wished me to take part in the discussions as they came up, which I did to some extent, for I felt at home among horticulturists.

The afternoon sesson was devoted to the reading of papers and discussions. Mr. M. E. Hinkley, of Marcus, and E. M. Powell, of Glen-

wood,read very interesting papers on general orcharding,advocating planting few varieties and those adapted to their locality; then with good care and cultivation, success was sure. They also spoke of the necessity of timber belts to make the rainfall more even and moderate the hot winds of summer. There were many other able and thoughtful papers read and discussed that afternoon on plums, cherries and small fruit, also the cold storage and marketing of the same. Mr. W. Bradshaw, of the Agricultural College, advocated the planting of trees, shrubs and flowers on school grounds and teaching the children how to care for them. It would be an advanced step in horticulture.

The evening session was taken up with the address of President Collman, which was an able and instructive address, claiming that Iowa had no reason to be second to any state in the Union in the production of apples, plums, cherries and small fruit. All that was necessary for such results was the education of the farmers and the necessary care for success. He also set forth the necessity of tree growing on the prairie for windbreaks and shelter belts. He also condemned the act of the last legislature in appropriating the room they had in the capitol to the attorney general's office. This was condemned in strong language by all. The secretary, Prof. Budd, of Ames, then made his report and also referred to the act of the legislature in appropriating their room in the capitol for other use. The treasurer made his report, showing they had plenty of cash to run their business.

Then came the election of officers for the ensuing year, when the following were the persons chosen: For president, M. E. Hinkley, Marcus; vice-president, J. M. Elder, Concord; secretary, J. L. Budd, Ames; treasurer, W. M. Bomberger, Harlan; librarian, Fred E. Pease, Des Moines; and also directors for the different districts.

Liberal premiums were awarded to counties and individuals.

The fruit exhibit was immense, more than 300 varieties of apples. It looked more like a fair than a horticultural meeting.

There were county exhibits from Mills county, in southern Iowa, and Polk county, central Iowa. Also exhibits from A. L. Plummer, of Ivy, and Mr. Stewart, of Des Moines, and fine individual exhibits by A. F. Collman, of Corning, S. A. Spear, of Cedar Falls, also, B. F. and John C. Ferris, of Hampton, and Alner Bronson, of New Sharon. This fruit had generally been cold storage and was in good condition and made a fine showing. The great bulk of the fruit on exhibition was from the southern part of the state and for that reason could not be adapted to our wants. We, in our latitude, have to look to the hardiness as well as the fruit the tree bears.

OFFICIAL NOTICE OF AWARDS AT COLUMBIAN EXPOSITION.

(This notice reached this office since the Jan. Horticulturist was issued. Sec'y).

Washington, D. C., June 4, 1894.

DEAR SIR:

I herewith inclose you an official copy of your awards which, in due time, will be inscribed in the diploma and forwarded to your present address, unless otherwise indicated by you.

Yours,

JOHN BOYD THACHER.
Chairman Executive Committee on awards.

UNITED STATES. DEPARTMENT B.—HORTICULTURE.

12384. Exhibitor, State of Minnesota. Address, St. Paul. Group, 21. Class, 145.

Exhibit, EXHIBITION REFRIGERATOR.

Award—A very ingenious invention admirably adapted for the purpose of preserving fresh fruits and vegetables. It is well suited to the purpose for which it is intended, and the practical test of the season shows its adaptability to other kindred uses.

Signed: E. F. BABCOCK,
Individual Judge.

Aprroved: B. STARRATT,
President Departmental Committee.

12385. Group, 21. Class, 136.

Exhibit, SMALL FRUIT.

Award.—Consists of such small fruits as raspberries, currants, blueberries, gooseberries and other kinds. The display was maintained throughout a long season and covers a wide range of varieties.

The fruit is exceptionally fine in quality, being of excellent flavor and in good condition.

The display was contributed by the following growers of the State:

J. M. UNDERWOOD, - - - - - Lake City.
J. W. FINCH, - - - - - - Eden Prairie.
J. S. HARRIS, - - - - - - La Crescent.
G. H. PRESCOTT, - - - - - Albert Lea.
C. W. SAMPSON, - - - - - Eureka.
M. W. COOK, - - - - - - Rochester.
THOMAS REDPATH, - - - - - Long Lake.

Signed: CHARLES W. GARFIELD,
Individual Judge.

Approved: THOMAS PUGH,
President Departmental Committee.

12380. Group, 20. Class, 122.

Exhibit, COLLECTION OF GRAPES.

Award.—A fine display, consisting of fifty-three varieties of the best known sorts. Both the clusters and the berries are large and well formed. The flavor is exquisite, and the condition of the fruit indicates that great care was exercised in the handling and arrangment.

The exhibit was contributed by the following growers of the State:

S. B. GREEN,	St. Anthony Park.
P. H. PERRY,	Excelsior.
MRS. I. BURTON.	Excelsior.
CHARLES W. SAMPSON,	Excelsior.
MRS. S. IRWIN,	Excelsior.
A. W. LATHAM,	Excelsior.
H. L. CRANE,	Excelsior.
D. BUCK,	Mankato.
E. J. CUTTS,	Howard Lake.

Signed: SYLVESTER JOHNSON,
Individual Judge.

Approved: B. STARRATT,
President Departmental Committee.

12386. Group, 21. Class, 133.

Exhibit, POMACEOUS AND STONE FRUITS.

Award.—Apples.—(Crop of 1892.) A fine display consisting of twenty-eight varieties, tastefully exhibited in a refrigerator case. The fruit is highly colored, of good flavor and quite free from insect and other blemishes. The nomenclature is perfect. Several new varieties of excellent quality are shown, which apparently are very promising.

Apples.—(Crop of 1893.) A large collection consisting of fifty-nine varieties, all of which are of the best kinds grown in the state. Many new and valuable kinds are shown. The fruit is uniform in size, beautiful in color and free from insect and other blemishes.

(Signed), E. F. BABCOCK.

Stone Fruits.—A fine display consisting mainly of plums and peaches. The special feature of the exhibit is the new seedling varieties of plums contributed by D. Cook of Windom and O. M. Lord of Minnesota City. All the varieties are of good size, color and flavor and in excellent condition. (Signed), GEORGE I. MOTZ.

Approved: B. STARRATT,
President Departmental Committee.

Approved: JOHN BOYD THACHER,
Chairman Executive Committee on Awards

Dated, May 16, 1894.

HORTICULTURAL EXHIBIT AT THE COLUMBIAN EXPOSITION.

(The following letter from Mr. J. M. Samuels, chief of the horticultural department at the World's Fair, will be of interest to many of our readers on account of its reference to his report and other matters. Every contributor to our exhibit, at least, should plan to secure one of the reports referred to. A. W. LATHAM.)

CLINTON, KY., Jan. 21, 1805.

MR. A. W. LATHAM, Minneapolis Minn.,

DEAR SIR:

I finished and submitted my report last April. It contained 2,900 pages of ordinary manuscript; but the editing committee considered

it too voluminous, and cut it down to correspond with those from other departments.

I gave Minnesota full credit for your excellent exhibit, and said more, perhaps, than you would have written yourself.

I used a photo of your display as one of the illustrations. * * *

The method of distribution of these reports will be through members of congress as other public documents; and constituents will have to make application to their own congressman. As soon as you learn the time at which the volumes will be distributed, (enquire of your congressman) put in your application for yourself and for your society.

I have no means of learning when John Boyd Thatcher will send out his medals and certificates.

The close confinement last winter caused me to contract a bad case of rheumatism, and I went to Florida in April. Of course, I could not remain idle and be contented, therefore, I had transplanted 22,000 pineapple plants, and quite a large number of orange, lemon, cocoanut, and other trees and banana plants, and started a winter vegetable garden. The recent freeze destroyed everything.

I was cured of the rheumatism; I suppose I ought not to complan.

* * * * * * * *

Yours truly, J. M. SAMUELS.

NOTES ON SMALL FRUITS.

GEO. J. KELLOGG, JANESVILLE, WISCONSIN.

Ed. Minnesota Horticulturist:

Perhaps I overdid the variety question on strawberries in your last report; but I am like the witness who swore the "horse was sixteen feet high"; some things I will not take back without more evidence. I stated that it was "impossible to prove any variety in less than three to five years on your own ground."

Four years of failure with Michel led me to say what I said. My former faith in it was from the recommendations of *Southern* growers, and the first jump we made was 1000 plants, and they fruited better the year of planting than ever afterward. Every recommendation we could find *then* was from a Southern standpoint and favorable. I have never found anything in the strawberry from the South valuable except Earle and Warfield. Perhaps, there are many, but this seems the rule. Canada berries are more often a success; and this latitudinal habit is often a key that is reliable.

Varieties.—I will only mention some of the best and most reliable sorts in this paper. I saw at Lake City the recommended list was of very few kinds. I must disagree with the committee on fruit list in only recommending such varieties as can be found at most of the nurseries. If trial stations and private enterprise have brought to the front any kind of fruit adapted and desirable, and it has been long enough tested so there is no room to doubt these two points, shall we as state societies decline to put such before the public, because some growers of nursery stock are behind the times? I think not.

The only variety of perfect-flowering strawberry your committee name that I can endorse is Bederwood, and this is going by rust unless we resort to spraying with Bordeaux mixture. A much better list, it seems to us after testing two hundred kinds, than the one given would be Enhance, Saunders, Splendid and Woolverton. These four are perfect in blossom and have proven profitable over a wide range of territory.

To the pistillates named by your committee, "Crescent, Warfield and Haverland," we would add Bubach and perhaps Greenville. We wish we could reduce the list to two varieties, but it is impossible. Pistillates, as a rule, are twice as productive as the perfects, the production of pollen serving to weaken the plant in *fruit* formation as well as production of *plants*. The four kinds of perfects we have named are vigorous, healthy and productive both in plant and fruit. We could name twenty more better on many soils than Capt. Jack and Wilson. For fruiting we would advise two pistillates and one perfect, alternating in the same row. For the former we would say set one long row of perfects and four feet away alongside set a row of pistillates, and have not less than two to four varieties in each row; then the *next* spring take plants from the *outside* of each row for two *new* rows; so continue, fruiting each for two years, at least.

If Shuckless proves *productive* it may be not only a *novelty* but a choice family berry, and as it is perfect in blossom, healthy in foliage and a good plant maker, we have much reason to hope. The new kinds that make wonderful promise are legion, but it takes a pocketbook and two years, at least, to prove anything in the strawberry list.

In conclusion, allow me to express my personal congratulations to your state society, officers, members and citizens of Lake City for courtesies received during my short stay. I would suggest to your Forestry Association that you take measures to plant or, at least, recommend for *general* planting the variety of timber you call "*Underwood.*"

TOPWORKING HARDY STOCK.

EDSON GAYLORD, NORA SPRINGS, IOWA.

I now refer to the recent development brought out by topworking our half and three-fourths hardy choice varieties onto extremely hardy stock trees. I hardly have words to express the unbounded confidence I have in the recent development brought out in our neighborhood. Were our successful efforts confined to one variety, to one tree or even to one orchard, which might, perchance, have been favorably located, trained and cared for, we might have reasons for doubts, but the experiments I now refer you to have been made on a great variety of stock trees as well as by the use of a great variety of cions, not in one orchard or on one tree, but in ten orchards and on a hundred trees and with a great number of our old choice varieties that we have learned to love so well in former years. Further, had we grown these fruits referred to by grafting them since '85, we

would not care to speak in anything like such strong terms of their future success.

The facts are that with the exception of one orchard the tests have been made on sites that are third and fourth rate sites. In short, we have the varieties on the best site duplicated by the same varieties that have been bearing successfully both before and since '84 to '85 on sites that rate no higher than numbers three and four.

You should know the varieties we have succeeded with on that plan. I will here note some few well known varieties that were all grafted before '84, and that nearly all bore before then and since, and will guarantee to convince any one who may wish to examine that the trees today will average as sound and as healthy as the Duchess in the selfsame orchard. Mr. Heiss has the Jonathan, the Ct. Seek-no-further, the Nod Head, the Wrightman's Russett, the Blanche, Ben Davis, Fall Orange, Willow Twig and others. I have on my grounds and where I have grafted the Fall Orange, the Minkler, Ben Davis, N. W. Greening, the Antonvoka, the Grandmother and Wolf River. Mr. Heiss has also the Walbridge and the Bethel.

Now, in conclusion I want to say to my brother farmers and others who love all those big apples, those fine red and rich yellow apples, come and examine our work and learn, both of our successes and our failures, and then go to work intelligently, and success will surely reward your efforts.

See that your stock is healthy and extremely hardy. See that the varieties are reasonably adapted to the stock you wish to set them on. In short, do not expect to grow all the most tender varieties; keep within reason. Commence at once on those worthless crabs and other hardy worthless fruit you now have and that encumber your grounds. Never employ an Eastern orchardist to do your grafting, far better to learn what is strictly necessary to success here in our climate and then do your own grafting, or train your best boy to do this work properly, and, my word for it, you will reach success by a much nearer and surer route than can be found through either the seedlings or the Russians.

We now have two great beacon lights before us, each all ablaze. Then, let us get our eyes open at once and climb out. The road by cross-breeding is freighted with the most valuable results in the end. This road is for the young men.

But for us who are showing gray hairs, let me say, take to the one short and sure road to success, by topworking our choice old varieties on to extremely hardy trees,such as the Hibernal,Virginia crab, Duchess and many others. That this plan is both advisable and feasable, I have no more doubt than I have that the sun will set tonight and rise again tomorrow."

April Calendar.

J. S. HARRIS, LA CRESCENT.

ORCHARD AND NURSERY.

No pruning should be done in this month except to cut back limbs that have been broken by the winter's storms or accident to a good bud or sound branch, and remove any dead limbs that have been overlooked. Wounds made should be covered with grafting wax or white paint.

Examine every tree carefully for borers and the eggs of other insects; probe the burrow of the borer with a wire, or cut the grub out and cover the wound with grafting wax. Destroy all insects' eggs found. Washing the trunks and larger branches at this time with soap suds or kerosene emulsion destroys the eggs and young larvae of insects and at the same time gives the trees a healthier appearance.

Look over the nursery, if it was not done last month, and if it is found that the winter has killed or discolored the terminal growth of the one and two year old trees, they should be cut back to sound wood before the circulation of growth starts, or the trees will become permanently black-hearted. If older trees are seriously injured they had better be cut off just above the roots and grafted to a hardier variety.

This is the best month for grafting, and any worthless varieties of apples, crabs and plums, where the trees are reasonbly hardy, should by grafting be changed into good fruit. The boys and girls can do the work if given a little instruction. Apple trees may safely be grafted until the blossom buds begin to open, but plums and cherries should be grafted before any circulation starts. Trees for spring planting will begin to arrive from the nurseries by the time frost is out of the ground. They ought to be immediately heeled in to prevent their becoming dry and shrivelled—the nurseryman is too often blamed for the result of our own neglect or carelessness. The trees should not be set out until the ground is dry enough to work without leaving it in a lumpy condition.

Young trees or limbs of trees that were budded last fall ought to have been attended to as early as the 20th of March. If not done already, cut them off at once to four inches above the bud, and about the middle or last of June cut off close above the shoot that grows from the bud.

The first spraying for leaf scab and other fungus diseases, should be done before the buds begin to open, using Bordeaux mixture or the copper solution. If trees are found to be infested with the scale or oyster shell bark louse, a thorough spraying with kerosene emulsion will be found very beneficial.

HOTBEDS.

Farmers hotbeds should be planted at once or as soon as the heat is right, and they must be given water when needed and plenty of air on all pleasant days. There is seldom any gain in planting any seeds of tender vegetables in the open garden during this month, but onions, peas and radishes, also lettuce, should be got out as early as weather and soil will permit.

THE FRUIT GARDEN.

Every farmer may and ought to grow enough small fruit to furnish his family an abundant supply.

About this time we rake the mulching on the strawberry patch from over the rows into the spaces between the rows. If the bed was carefully cared for last year, it will need no cultivating before the fruit is all harvested; if not, it may pay to go through between the rows with a fine tooth harrow cultivator,in which case the mulching is pitched into every second or third row and back again as the rows are cleaned. Weeds among the plants should be cut or pulled out.

Clean up the raspberry and blackberry plantations. Lift the canes carefully that were laid down last fall for winter protection and do the necessary cutting back and pruning before the buds start. Give bushes support by fastening to stakes on wires, if possible, and as soon as the soil is dry enough, cultivate between the rows. Set new plantations of the reds and of blackberries,as early as the season will allow. The making of new strawberry beds should also be attended too by the last of the month in order to get established before hot, dry weather sets in.

Currants and gooseberries should be cleaned out and pruned where necessary by cutting out old and surplus canes,and a thorough cultivation given before the buds get started. Good barnyard manure worked in among all kinds of fruit shrubbery at this season will increase the crop of fruit and improve the quality.

New plantations are better for being made early, but in no case should the ground be plowed or plants set when the soil is too wet.

Grape vines are better to be uncovered early, but should not be fastened to the trellises until the buds begin to swell; until then they had better be horizontal or only the end buds will start. Manuring is always in order during this month. A close watch should be kept for insects,and if they appear,spray with a solution of Paris green, one pound to 300 gallons of water.

THE MINNESOTA
HORTICULTURIST.

VOL. 23 MAY, 1895. NO. 4.

Biography,

JONATHAN T. GRIMES.

(SEE FRONTISPIECE.)

Jonathan T. Grimes, the subject of this biographical sketch, was born in Loudon county, Virginia, May 10, 1818, and is now seventy-seven years of age. His great ancestor, on his father's side, was deputized by the crown of England, and sent over as Collector General for the District of Virginia, which then included the Carolinas and all the territory tributary to the west. The name was spelled G-r-y-m-e-s, after the old English style of spelling at that time.

His grandfather was born in Westmoreland Co., Virginia, near where Gen. Washington was born. About the time Washington removed to Mount Vernon, in Fairfax county, Va., his grandfather also removed north and settled across the river nearly opposite, in what was called "Virginia on the Maryland side of the Potomac," in the neighborhood of the Lees, one of whom had married Miss Lucy Grymes, who became the mother of Gen. Henry Lee, more commonly known as "Little Horse Harry," who was the father of Robert E. Lee, of confederate fame. But this is a matter of history. His grandfather was a soldier under Washington in the Revolutionary War for independence. The family afterwards removed to Leesburg, Loudon Co., Va., where the subject of this sketch spent his early life.

His father was opposed to slavery, having adopted the principles of the Quakers; so, when the son attained his majority, he came to the conclusion that, as they did not own slaves, he would not consent to live in a slave state, and gathering up his belongings, he started for the West and finally located near Terre Haute, Ind. This was in 1840.

He was married Sept. 20, 1843, to Miss Eliza Gordon, who still presides as his better half.

In 1855 he came to Minnesota and bought a little home in a small town of about 300 inhabitants, called Minneapolis. During the hard times of 1857-8, when business became very dull, he purchased, five miles west of the city, a farm where he could make a living by honest toil. He soon had his farm in condition to plant and put out some fruits, principally small fruits, such as currants, strawberries, raspberries, etc. There was very little fruit shipped here at that time, so he obtained good prices for several years, and his venture proved a grand success. The apples did fairly well, but the trees proved to be short-lived.

About this time the State Horticultural Society was organized. Although his name was not enrolled as a member until 1868, he was present at the Rochester meeting in 1867, and has been a constant member ever since, contributing his annual dues willingly, until the society said: "Hold on, we have made you a life member!" He established the Lake Calhoun Nursery a little before this time, and carried it on successfully for many years, adding materially to the comfort and adornment of many homes. Twice he has been elected president of the State Horticultural Society and five times its treasurer. He was appointed delegate to the Centennial Exposition at Philadelphia, in 1876, also representative to the Mississippi Valley Horticultural Association, held at St. Louis, in 1882, and was a delegate to the American Horticultural Society at San Jose, California, in 1888.

Mr. Grimes, in taking a retrospective view of the history of the society and his connection therewith, says: "If, through my humble efforts, I have done anything to advance the interests of the society or the promotion of fruit culture within its bounds, I feel that I have been more than repaid and my work more than appreciated in the confidence and honors which this society, in its good pleasure, has conferred upon me."

"Allow me to rejoice in the society's prosperity? You commenced weak and feeble; you are now strong and healthy. The old workers will soon lay aside the shield and helmet, but younger men and women are flocking to the standard to take up the work and carry it forward with a vigor worthy of the cause, while Bro. Harris and all those veterans in horticulture must soon retire behind the scene and no longer wield the plow and spade, but like the autumn leaves, ripe to the full, must soon be scattered by the winds to whence? We know not of the future, except what has been revealed."

ANNUAL APPROPRIATION OF THE MINNESOTA STATE HORTICULTURAL SOCIETY.

Act of the Legislature relating thereto, approved April 25, 1895.

"SECTION 1. Nineteenth. For the expenses of the Horticultural Society for the fiscal year ending July thirty-first (31), eighteen hundred and ninety six (1896), and annually thereafter, in addition to the annual appropriation of one thousand dollars ($1,000.00) already made, which is hereby confirmed and re-enacted,—five hundred dollars ($500.00.)"

The above is a verbatim copy of that portion of the general appropriation bill relating to our annual appropriation. It re-enacts and confirms the present annual appropriation of $1,000 and adds thereto annually $500, making the total annual appropriation, $1,500.

The passage of this law and that in regard to our printing (to be found in the February number) were secured practically without opposition in the legislature. In the house on its final passage three members voted "no," one of whom told me later he voted that way because he did not understand the matter. In the senate there was no opposition whatever.

In all my intercourse with members of the legislature, I heard only the most kindly words for the work of this society; and if the encouragement that comes from a knowledge that our work is well appreciated is of any value to us, we may be sure we have it to the fullest extent. We shall continue to show our worthiness of this appreciation and with the increased facilities at our hands assume earnestly the increased responsibilities that come therewith.

Many of our members assisted materially in securing this legislation, and to them the society is under special obligation; but the number is so nearly equal to the number of our membership that only a general reference can be made to them. It is this common willingness on the part of our members to work all together for the good of the society that makes the association such a power in the community and is bringing its work into such prominence. We are co-laborers in a good and pleasant service.

A. W. LATHAM, Secretary.

General Fruits.

GENERAL FRUITS, FIRST CONG. DIST.

E. H. BUTTERMORE, LAKE CITY.

The past season was very unfavorable for small fruits in general in our district. Strawberries got through the winter seemingly all right, but the excessive drought shortened the crop immensely, and the same cause affected all our small fruits except grapes, which were a fair crop. Our apple crop was also very light, owing to late frosts and intense prolonged drought. We had a mild, early, warm spring, which caused everything to vegetate so beautifully. My orchard blossomed delightfully, and just when in full bloom there were one or two severe frosts which injured the most of the blossoms and some of the terminal parts of the limbs, which afterwards, looked like blight.

An examination of the orchards shows the shortest growth that has been made for years. The drought during the summer stunted the trees so that they grew very little all summer. But there have, fortunately, been quite a good many rains since, which have filled the soil and helped the conditions generally for next year's crop.

Last year in my paper at the annual meeting, I related some of my experience in orchard raising and some of the greatest impediments to my success; now I will tell you how I plant my trees in places where occasionally one dies. I dig out *all the dirt and roots* where the old tree stood and make a *big hole*, and then throw in a little dirt *that never was near an apple tree before;* then I place the young tree in line with the others, and then take more *new dirt* and fill up around the roots. In this way, I succeed remarkably well.

The best time to prune is in June; the wounds then heal over with least injury. I avoid pruning as much as possible. The best way is to rub off the young buds soon after their appearance; then the force of the growth is diverted into channels where it will be more useful.

Some orchardists think it better to let all the saplings and sprouts grow, but I like a nice-shaped tree, and if the orchard is kept right, there need not be any damage done by pruning.

About thirty years ago, when the prairies were breaking up, I had a piece broken where I intended to build and sow some grain and, also, plant trees and a little orchard. In this connection I would state that I was and have been a lover of apple trees and orchards, and believe a great part of the success in apple raising *depends on the interest* that is taken in it. I planted my orchard where I thought it would do best, on the south side of the slope, thinking it

would do better there in this cold climate. The varieties which I planted were different kinds of Siberians, some Russets and other kinds of apples,also a few pear trees and some cherry trees. But after a few years the Siberians began to blight,and every tree in the orchard seemed to be infected and declined steadily till they died. Afterwards I planted a plum orchard in the same place, and it is doing well.

In some horticultural paper I saw it advised to plant on the north or northwest slope, so I went to work and prepared the land a year before I planted. I planted a windbreak of evergreens at the same time. The apple trees grew faster at first, but afterwards the evergreens got up and are now higher and *look so attractive and nice* around the orchard. I have a great many varieties of apple trees planted and almost all are doing well, and some of my best trees are within sixteen feet of the evergreens. We had quite a few apples last fall, considering such a dry summer, enough for ourselves, and we sold some for one dollar per bushel.

If I were to plant a new orchard, I would prepare the land by manuring heavily and plowing deep in the fall previous to the planting of the new orchard. I should select the *north or northwest slope* of a small hill or rise of ground, as from that point we get the hardest freezing, and, consequently, it penetrates deep into the soil and takes longer to thaw out, and thereby prevents the sap from flowing too soon, and in a great measure prevents "sunscald." I should select small or young trees, as they need not be set so deep as older ones. To grow viorously the roots need the influence of the atmosphere, light and heat as well as rains and cultivation. They make a slow growth if buried too deep. The trees should not be set deeper than they stood in the nursery. I prune off the injured roots; the remaining ones I extend in their proper direction, not too dipping. Care should be taken that the roots or tree should not be hurt by the hand or spade.

There is much difference of opinion as to the merits of fall and spring planting. My opinion is now that the fall is as good as anytime. We generally have more time, the ground is in better shape, and, I believe, the trees will stand the drouth better.

I should plant the trees twenty feet apart each way (on our prairie) *all leaning a little against the hill*, WHICH POSITION, I find by experience, gives the BEST RESULTS and which gives the orchard a graceful appearance. When planted on level ground in the above position the trees look odious. When going to Cresco, Iowa, I saw a young orchard planted, all the trees leaning towards the south; to me they looked very odd. They looked like a man that had taken too much strong cider, who was topheavy and had lost his balance.

When I plant the orchard I shall plant a windbreak of evergreens all around it—I should not plant an orchard without a windbreak, and the *best is evergreens*. Some of our horticultural friends advocate about windbreaks that "Apples naturally get tenacious when battling against the wind." My dear friends, you would not wish to be in their place, hammered together till your sides were black and eventually pelted down *black and green*, the more tenacious the

more hammering. Orchards may do well without a windbreak for a few years, but there will *winters and seasons* come, with *unusual severity, and terrific cruel windstorms*, which will impair the vitality of the trees and soon terminate their existence. Young trees should be *lightly cultivated* or hoed as soon as the ground can be worked in the spring—at least, twice a week. By this means I have succeeded in raising evergreens and apple trees, almost without losing a tree. I have found *light cultivation* of the soil *the best means* of keeping the moisture in the ground. Moisture is retained in the soil by *very frequent but shallow tillage*, by means of which the surface of the land becomes a mulch for the soil beneath. After a rain do not let the ground crust over, but commence cultivation as soon as the land is fit to work. Tillage should begin as soon as the ground is dry enough in the spring and should not be extended after the month of July. *The greatest care* should be taken of apple trees when digging in the nursery and storing in the cellar, &c., and also by the purchaser on the way to where they are to be planted. The roots should be protected from the sun and drying winds and be kept moist. I believe there are more losses sustained in this way than most people are aware of.

We should by all means, if possible, prevent "sunscald." I believe the most damage is done in the early spring. The effects will not be seen till in the summer or, probably, the summer after. I believe it is effected by a thaw and an unusual mild and warm spring producing a too early flow of sap and then a freeze, after which *the first warm rays of the sun from the southeast* thaw out the trees and, thereby, hurt them materially. I have a great many soft maples that the bark burst open near the ground from the above cause; some of them will never recover. The apple trees do not produce so much sap, consequently the bark does not burst, but they are, nevertheless, hurt.

I believe by patience and perserverance we shall succeed in apple raising in Minnesota. There are *important possibilities in future developments. Thirty years ago I was glad to be able to raise little Siberians, now we can raise hundreds of barrels of delicious standard apples.*

GENERAL FRUITS, FIRST CONG. DIST.

J. C. WALKER, ROSE CREEK, MINN.

My remarks will be chiefly upon the apple crop of 1894. It has been an off year for this fruit with me, on account of the late frosts in spring time. I have always mulched my trees late in the winter, while the ground is covered with snow, for the purpose of keeping them as late as possible, to avoid late spring frosts. Have never failed of a good stand of fruit when kept from blossoming until the first week in June; last winter I was on the sick list and could not attend to the mulching. A warm March hastened the season and apples were in full bloom in the middle of May, being two weeks ahead of the proper time, consequently, they were caught with frost

on the eighteenth and twenty-eighth of May, cutting off largely the crop. But for these two frosts, my apple crop would have been very great. We do not feel discouraged, but hope and work. Two years ago my wife gathered three barrels from one small tree, that my hands clasped round the butt could just reach around. The kinds of apples that are doing well are Duchess, Ben Davis, Pewaukee, Wealthy, Haas, Plumbs Cider, Early Strawberry and a Duchess seedling; pears, Early Wilder and Idaho.

What I am now going to say may help some tree grower. Years ago several of my apple trees were troubled with loss of bark some half-way round, and I supposed they would soon die, but they did'nt. I just gave the bare places a good coating of raw linseed oil, preserving the wood hard and lengthening the life of the tree.

I am encouraging all to work, to bring out of the earth some of the good things there are in it.

GENERAL FRUITS, SECOND CONG. DIST.

C. F. BROWN, ST. PETER.

I regret that I cannot favor you with a complete report on general fruits for 1894 for this section of the second congressional district, but I will give an outline of my observations on the subject. In general, it is the same story that, probably, all the localities in this state will have to report on the subject of fruits—the drouth was too severe for favorable results. It has been so dry for several years past that the trees and vines have had a struggle for existence without the additional task of producing fruits. It has even been difficult to keep shade trees thrifty. I do not think that the prospects for 1895 can be very promising for the reasons mentioned above. An additional problem besides the cold seems to confront the fruit raisers, the one of drouth, with these adverse circumstances; it cannot be considered a promising future. Apples were in a very limited supply, but more Duchess were in the market than Transcendents. The latter were only offered in small quantities, partially from the fact that in previous years they were produced in such an abundance that there was little sale and no profit in raising them; consequently, orchards that gradually killed out were not replanted, but the few that did replant had substantial evidence of their wisdom. Transcendents sold for more money per bushel than Duchess.

Strawberries promised well but the drought cut them short, and the supply was less than for many years past. Raspberries had the same history as strawberries, except that the drouth overtook them before they gave promise of future greatness. Currants, a fair crop. Grapes did fairly well but, I think, not up to the average yield. Plums were a large crop and of good quality, and in this fruit I noticed what seemed to me a remarkable feature, in the fact that they were of good flavor and size, yet in 1893 they were a failure in quality and quantity and seemed to be withered and off flavor. It may be that owing to the light crops produced for the few years past, the trees became vigorous enough to produce the crop in perfection or, possibly, the spring rains were sufficient for this fruit.

GENERAL FRUITS. FOURTH CONG. DIST.

R. KNAPHEIDE, ST. PAUL.

I am sorry that my three score and ten years rest so heavily that I cannot be with you and enjoy the profit of the exchange of views, thoughts and experiences of this session. My report on fruits must necessarily for the same reason be brief. 1884 was in some lines an exceptional fruit year in our experience in the fourth congressional district; we had no late spring nor early autumn frosts and no special plague of insects or caterpillars. The dry spring and summer season made good breeding weather for the birds, and they were much more numerous than usual, which, in part, probably, accounts for the freedom from caterpillars and insects.

I believe that nowhere in the United States can there be fruit grown with such fragrant bouquet as in our own state, nor am I alone in this belief. I read with interest an article in one of our dailies last summer, where in the writer, an old soldier, gives his recollection of a controversy as to who was in command of a certain expedition against the Indians in 1862, near New Ulm. After telling of the devastation committed by the Indians along the route and how noticeable the presence of Indians was in the vicinity in which they were traveling and what a sharp lookout they were keeping, he says, "Captain and myself got orders to go along up the river to see about a fording place. It is the only time I ever disobeyed orders. We ran across a grove of plum trees and could not resist the temptation of regaling ourselves on the delicious fruit." Gentlemen! Just think of it! What an argument in favor of the superiority of the flavor of our fruits! An old soldier, who has enjoyed the fruit season of the in sunny south, although in a dangerous position, Indians to the right of him, Indians to the left of him, yes, Indians all around him, still plums must be had by him! It reminds one of a pre-historical event where fruit also played a temptational part.

While we do not exactly want to lay claim to a fruit paradise, or a garden of Eden, for our state, we do claim that what fruit we do grow has a flavor superior to any of similar kind grown elsewhere—and 1894 was exceptional in that respect. The grapes were specially fine and brought twice the price that the imported fruit brought, and sold easily. The plum crop was fair, as to price, quantity and quality, though the fruit was smaller than usual. The apples for some reason, which I cannot explain, blossomed beautifully and looked healthy but bore a light crop. Our strawberries were not a success. Raspberries were a success and are proving to be a good paying fruit. I notice a tendency of a number of the fruit growers in our district to go largely into tomato growing and, although we have no cannery, they were not a drug in the market; on the contrary, they brought good prices.

Now a last word as to our wild fruits, which irresponsible parties are vandalising. Take, for instance, the grape. How many will we have left in a few years? How many have we even now? In order to gather the fruit, the vines are cut off and the whole plant is torn down and annihilated. So it is with our other fruits. We have a game law and game wardens; why not make it the duty of the same parties, and give them the supervision and have them look after our wild fruits? It would add no extra cost to the state and would be an act of justice to posterity.

GENERAL FRUITS, SEVENTH CONG. DISTRICT.

S. JACOBSON, TORDENKSJOLD.

You made a great mistake in appointing me to give a report on general fruit raising from this district. I was grown up within the boundaries of the polar circle, and was about twenty-five or twenty-six years of age when I saw the first apple, and thirty-four when I saw the first apple tree. Besides that, I am not acquainted in more than six or seven towns in the whole district.

The first fruit trees planted here were planted twenty-two years ago. Some of them (Transcendent) are living yet and have borne more or less fruit every year, but they are now looking very badly. Everybody claims that the first trees planted were the best and have given the best satisfaction. Mr. P. Jensen, of this town, grown up among fruit trees in Denmark, has done his best to raise apples of different varieties, and he claims that the Transcendent is the only kind worth planting. The trees that are best shaded live the longest. He has also tried grapes but without any success. With currants he has had some success. Mr. Dahlen, of St. Olaff, has a few Transcendents, twenty-two years old, that are bearing every year. They are surrounded on three sides by an oak grove not more than three rods from the orchard. Mr. A. Vollen, of this town, has his trees planted twelve feet apart and also gets some fruit every year, more or less; the Transcendents are the only kind that will succeed with him, too. I started my orchard in 1887, in 1892 some of them bore a great deal. One Wealthy had ninety-eight nice apples, another forty-six. Both died last winter. One Duchess of Oldenburg had three apples in 1893, and another year four. They are living yet, but are poor looking. Two other trees, of which I have lost the name, died the second year after planting. I also have some Transcendents that bore considerably in 1892; some of them have blighted and two of them have died of blight. The blossoms froze on the trees last spring.

I have one Concord grape vine that has borne for two years, and some currants which are doing well. I also have a few blackberries, planted in 1893, that are doing well so far. In 1893 I planted some trees again, of which all the Trancsendents are living yet, three Duchess and three Hibernals are living and two Hibernals, three Tetofsky and three Early Strawberries are dead. Planted also six Thompson seedlings, of which three are alive; six Okabenas,two living; nine Virginia crabs, of which one is living; six, of which I have lost the names, doing nicely. There appeared black spots on the trunks of these young trees which grew larger and larger until the trees were killed. Mr. J. Olson, of Dahlton, and Mr. Chris Robertson, of Underwood, planted, in 1893, half a dozen each of the Peerless, they are doing well at both places.

Most every farmer in this vicinity has planted some trees, but hardly one of every hundred trees have repaid the trouble and expense, and most of the farmers get angry if one suggests to try again.

Trees received from the nurseries are often in a poor condition;

they seem to have been subjected to bad handling, nearly no roots on them, broken branches, and often the bark is rubbed off in different places. I also believe that the trees, as a rule, are too big when they are five or six feet high; I think it would be better if they were only three or four feet.

Every body that I have spoken with claims that Transcendent is the kind that will thrive in this country.

VICE-PRESIDENT'S REPORT, FIRST CONG. DIST.

F. W. KIMBALL, AUSTIN.

I have to report that in our section the high anticipations of the early spring for an abundant fruit crop were severely checked by the late frosts of spring and the severe drought of the later season. The winter had been remarkably favorable, and trees and shrubs, as a whole, had gone through in good shape, presaging an abundant crop; but the late frost, or rather freeze, about May twentieth, killed a good many brilliant prospects, especially on low grounds, while orchards on high grounds with good air drainage in a great measure escaped and brought a fair crop of good apples. Except with a few, the Oldenberg, Wealthy and Transcendent are at present the leading apples, especially the Oldenberg. The Transcendent are fast disappearing, killed by blight.

The small fruits, excepting currants, gooseberries and grapes, were almost an entire failure, owing to the drought.

Having been so situated that I could make but little personal examination, my report is of necessity limited; and having little fruit in bearing the past season, I can personally give but little information; but in view of the extreme drouth the past season I wish to make one suggestion which I think can be successfully carried out by many having small patches of small fruit, situated handy to a good well. Going home one day just as the first strawberries commenced to ripen, I found the vines very sick for want of water, and without immediate action no berries for the family. I immediately made plans and that day laid a line of pipe from the pump—and the children by a few hours work saved the crop, small though it was; and, notwithstanding its injured condition, nearly four bushels of berries were picked from less than one-twentieth of an acre. I propose to extend the pipe and, having various places to connect hose, I can with a windmill, at a slight cost, water an area of two or three acres; for at the critical time but little water is needed to save the crop.

At this time I wish to refer to the great benefit of mulch. My garden and small orchard is not on the best of soil to withstand drouth, being about three feet of clay on top of a sand hill. I had two patches of raspberries in near proximity, one I mulched in the winter with from six inches to one foot of strawy manure; the other I left bare, and during the summer gave it frequent cultivation, keeping a fine earth mulch. The one mulched with straw probably gave

as many again berries according to area of ground as the cultivated ones.

In the spring of 1893 I set sixty-seven apple trees, and though we had a severe dry fall, I lost but one tree. In 1894 I set above 125 and, nothwithstanding the long continued drouth, I am led to believe that I will not lose more than one or two. These were all mulched as much as I mulch my strawberries, and no water was applied except to three or four which were very large when set, and I feared they might not have root enough to stand it, and, it being convenient, a few pailfulls were applied. My garden also illustrates the desirability of air drainage. I am on the edge of a patch of land some fifteen or twenty feet higher than the valley below, and I have noticed several times that the gardens of my neighbors, some forty to eighty rods further back on the same level bench, have been injured by frost while mine has remained unscathed. I speak of these matters only as corroborative of the theories advanced as to the desirability of air drainage.

I greatly desire a full discussion by the society of some method of getting to the rank and file the information and spirit necessary to stimulate a love for and desire to engage more in fruit growing. My own views are that various local societies fostered by this society can and will accomplish much. For the past two seasons Mower and Freeborn counties have had meetings, and, I believe, an interest has been awakened such as could have been done in no other manner. Many who do not subscribe for and read this society's reports attend the meetings, get interested in the discussions and are lead to read our reports, and thus become educators in their own neighborhood. Few seem to understand how many there are that are interested, yet do not seem to know how to get hold of and grasp the information wanted. I firmly believe that a few societies scattered through the state, fostered by this society, would in a short time accomplish much in building up the parent society.

DISCUSSION.

Pres. Underwood: Has any one any questions to ask Mr. Kimball on his report?

Mr. Wedge: How many strawberries did you get from your bed?

Mr. Kimball: It was a little less than four bushels. The bed measured less than eight rods, about the twentieth of an acre. I wish to say that the bed was nearly gone the day I came home; it was only a small one in my home garden; two days more would have finished it. The children picked for me a few berries, and when I went out in the morning, I found the vines were wilted and the berries were drying up. I got a pipe and laid it perhaps one hundred and fifty feet from the well. The children pumped water on the bed twice—I think they told me they pumped water twice; and from that small bed we picked

from the time the water was applied, 128 quarts of berries. The bed might have measured a little short of eight rods, or less than a twentieth of an acre, but they picked nearly four bushels of berries.

Pres. Underwood: Are there likely to be any ill effects from putting cold water on the plants?

Mr. Kimball: Seemingly not there.

Pres. Underwood: Do you think it would be perfectly safe to irrigate our home gardens with city water?

Mr. Kimball: I think it would. It revived the strawberries immediately. Of course, I can appreciate there were many berries that were not filled out, but it seemed to revive the whole crop immediately. It takes very little water at the proper time, and the difference between a small fraction of an inch of water and no water at all is the difference between success and failure in raising a crop of strawberries or any other crop. That I can realize from my own experience.

Mr. Brackett: What kind of a well have you, Mr. Kimball?

Mr. Kimball: I have one of those tubular wells, six or eight inches in diameter, sixty feet deep. The flow is not larger than the majority of wells, but continued pumping will not exhaust it; and I think from what my observation has been as to how little water it takes, I could raise enough from my well to save a crop of two or three acres. I laid my pipe through my garden, and every hundred or hundred and fifty feet I put in a plug so I could shut off the water at that point; and if I wish to carry a branch line, say, fifty feet or so, I can attach my hose to a plug and carry my water to any part of the garden at a very small item of expense.

Mr. Mackintosh: At what time did you do the watering?

Mr. Kimball: In the evening; my children did it in the evening and morning. I think it was applied twice, and it took probably a couple hours of work.

Mr. Mackintosh: Was the bed mulched or cultivated?

Mr. Kimball: The summer before I had mulched it with cornstalks which I got from a neighbor who had no use for them. I put on cornstalks from the fact that I am not much used to taking care of strawberries, and I was afraid straw would blow off; so I put on cornstalks. I thought they would lie right where they were put. Of course, they were not allowed to remain, and in the spring I removed them, and the bed was left without mulch.

Mr. Brackett: In what shape was the water put on?

Mr. Kimball: I had a hose with a nozzle on, and while one pumped the other held the hose.

Pres. Underwood: Did you apply it directly on the vines?

Mr. Kimball: Yes, sir.

Mr. Brackett: What size is your well?

Mr. Kimball: I think it is a six inch pipe or, perhaps, eight inch, and the well is sixty feet in depth. While I do not think it is, perhaps, a very large flow, yet we never had any occasion to drain it; we always had plenty of water at hand. We are on a bench of land twenty-five feet above the river, and the well, of course, is much below the surface of the water, and we have as good a supply as we can expect to get.

Mr. Wedge: Are you not mistaken in the size of your well? Our tubular wells are usually three inches in diameter.

Mr. Kimball: Well, mine is larger. I do not think I am mistaken about that.

Mr. Hitchcock: Have you any idea how much water you used? Did you merely sprinkle it, or did you use a half inch or an inch?

Mr. Kimball: I could not say as to that. I should say not as much as an inch. It might be approximately that. It takes considerable water to make a half inch. Strawberry roots are near the surface, and the bed was easily revived. They are not like the roots of trees where you must thoroughly soak the ground to get it to the roots.

Mr. Hitchcock: I have had considerable experience in irrigating strawberries and other things, and your facts and theories are both altogether different from mine. My experience tells me that it takes at least an inch of water to do any good.

Mr. Kimball: I cannot say to a certainty how much water was used. It was done in my absence by my children, and they said it took them about two hours each time to cover about eight rods. I think they would have to pump pretty hard to pump over half an inch of water to cover eight square rods.

Mr. Hitchcock: Our practice is to let the water down the rows between the plants.

Mr. Kimball: My children put it right on the beds. It did not come fast enough to let it run.

Pres. Underwood: We approximate the amount of water used by the time the children spent in pumping it. (Laughter.)

Mr. Kimball: I am satisfied from what I have seen in the West that it takes very little water to tide over a crop if ap-

plied at the right time. There may be a difference in soils. In sandy soil, of course, it takes more water. I have noticed a number of times in the Black Hills district it took very little water to mature the crop, and it is very frequent in that country that a man's crop will be saved by one shower, and not a very extensive one at that. In many localities, I noticed they had a local shower and had a good crop, while a mile and a half a way they failed to get a shower and they failed to get a crop. The difference of one shower has made the difference between an entire failure and a good crop, and I believe that, as a rule, it requires very little water to affect a crop, and there are very few seasons when we do not have a drouth when one or two wettings would save our small fruits. I am judging from what I have seen of its effects on crops in the West, and in my own experience I know it did not take much water to save my strawberries.

VICE-PRESIDENT'S REPORT, SECOND CONG. DIST.

S. D. RICHARDSON, WINNEBAGO CITY.

We had a frost the latter part of May that seriously injured the strawberries in many places, especially where they were heavily mulched with straw, killed the most of the cherry blossoms and injured the apples in some places. The hot, dry weather completed what the frost had begun, and the strawberry crop was nearly a failure in this section. We had a few rows on an undrained slough that did not suffer from the drouth and produced an abundant yield. Raspberries and blackberries were nearly ruined by the dry, hot weather, and the birds seemed to want more than their usual share —perhaps the dry, hot winds made them thirsty. Currants and gooseberries were not as large as usual but were a fair crop.

Plums set unusually full, but the drought made them smaller than usual. Only where they were thinned and thoroughly cultivated and manured so the ground was rich and mellow, there they were unusually fine. The drouth seemed to affect different kinds of plums in different manners. The Miner ripened fully three weeks earlier than common, while the Desota this year were later than the Miner. Apples were a fair crop. Some orchards hung very full, while in some places there were many more windfalls than usual. They were not as large as usual and have not kept as well as they did last year. Grapes were of good quality and a fair yield.

VICE-PRESIDENT'S REPORT, THIRD CONG. DIST.

L. E. DAY, FARMINGTON.

I cannot report any great increased interest in fruit growing in this district. Yet while some have become discouraged on account of the many hindrances in the way of making it profitable, others seem to have become more determined by these very discouragements to make it a success. Among the latter are those who give us reason to expect victory in the end.

Last spring everything looked favorable for a good crop of fruit. Trees and vines were loaded with bloom, and all vegetation was growing rapidly, with the new growth of the grape vines from ten to twelve inches long and strawberries in bloom, and a part of the fruit already set, when the severe frost came and the new growth of the grape vines was nearly all killed, and the strawberries were not only killed, but many of the fruit stalks were killed to the ground. Apples, such as Duchess, Minnesota and other varieties, were reduced to one-third of a crop, and some trees gave none at all, on account of the fruit spur blight, frost or the three days of cold northeast wind blowing at time of bloom. Perhaps, all three had something to do with it but, it appears to me that to the first the greater blame can be laid, for the Brier's Sweet, Beecher's Sweet, Power's Red, Meader's Winter and other varieties were not so affected.

The plum crop was so abundant there was not much sale for them—even the Harrison's Peach bore heavily, which was unusual for this variety.

Grapes, where they had not been uncovered before the frost, produced a fair crop. Currants and gooseberries bore very sparingly. Strawberries produced a good crop where the mulching was kept on the vines until after the frost, and where they were well mulched to protect from drouth, which at the time of ripening had become severe. Raspberries were cut short by the drouth and extreme heat and produced about one-half a crop. Blackberries nearly all dried up on the vines when one-third grown.

There have been a good many fruit trees planted in this district the past year, but on account of the severe drouth and heat, some have died. The two past years have not been favorable for tree planting, and this year blight has been severe.

In June, I had the privilege of visiting Owatonna, also Mr. Dartt and his orchard and exeriment station. I was very much interested in what I saw and feel that it was a half day profitably spent. With the careful management of the experiment grounds, as was there illustrated, where the trees, plants and seedlings by the stakes and numbers could be readily found, and with other stations as carefully kept, we certainly have reason in the near future to expect great results in developing trees that will stand our climate and at the same time give us an abundance of fruit. There must be many enemies to our cause, but much labor has always been the cost of excellence.

VICE-PRESIDENT'S REPORT, FOURTH CONG. DIST.

R. S. MACKINTOSH, ST. ANTHONY PARK.

The fourth district cannot boast of anything in horticulture out of the usual course. The yield of small fruits was not as encouraging as we had hoped for early in the season. In this district the drouth was very severe, and, in looking back, it seems wonderful how the vegetation withstood the dry weather as well as it did. The apple crop was very light, due, no doubt, to the injury of the buds in the winter and early spring. In some localities the blight appeared and destroyed many young trees.

The weather during the time the fruits were in bloom was perfect for pollenization, and, as a consequence, very few imperfect specimens of fruit were observed. The berries, as a general rule, came through the winter in good condition. The warm spell at election time made many feel that spring was at hand and that it was time to remove the winter protection. To those that did uncover their vines, it proved a serious mistake, for the cold weather afterwards injured them very much.

The period for planting was very short on account of disagreeable weather. Possibly it was as well, for the dry weather afterwards made it very hard for newly planted trees and vines to withstand the drouth unless watered artificially.

The strawberries being the first fruit to mature had some advantage over other small fruits by having quite a supply of moisture in the soil. Many beds, however, suffered considerably, and in some cases several pickings were lost. During the season when the strawberries were ripening, the weather was very hot and windy, and this also caused quite a loss. The St. Paul market has in the past few years been largely supplied with nice strawberries from Afton, Washington county. The steep bluffs near lake St. Croix are especially well adapted for strawberry growing. The soil is light, warm and rich, and if a sufficient supply of rain is obtained, a large return is realized. This season was a very poor one for these growers. One feature of the berry crop which comes from this vicinity that needs to be commended, is the way in which they appear in the market. Nearly all the growers use small baskets placed in nice crates holding thirty-two quarts. The contrast between this way and that of the old fasioned tray is very noticable. The trays should be discouraged as much as possible, since it necessitates more handling.

Plums, both wild and cultivated, produced good crops. The plum pockets must be carefully looked after or else the crop will be ruined. In some localities it appeared last spring. The setting out of cultivated plum trees should be encouraged more; all persons that live on farms should at least have enough to well supply their families of their own raising. A little thought and care will be well repaid when the fruit is harvested.

DISCUSSION.

Mr. Dartt: You spoke about the plum pockets. Will you tell us about them? You told us to look after them when we found them. What shall we do when we find them?

Mr. Mackintosh: They should be picked off and destroyed when they appear. That is the advice of Dr. Lugger, and that is the way we do it at home.

Mr. Harris: Did it do any good?

Mr. Mackintosh: That we can tell in the future.

Mr. Harris: I do not think it affects them after the first crop, and that takes all the plums on the trees.

Mr. Anderson: Are wild plums as much affected with the pockets as tame ones?

Mr. Mackintosh: I could not say, but I think cultivated plums are more subject to it. I have not been out in the woods very much; I could not say.

Mr. Wedge: I think that my experience is that cultivated varieties are not more subject to the disease than the wild. There are some varieties of our cultivated plums, like the Cheney, that are usually very much injured by it, but I needed something like it to thin my Desota. I think the plum pocket in some varieties would prove a blessing.

Mr. Harris: It was a benefit to the Cheney plum last year. I had some Cheneys that were nearly two inches in diameter. It was the same with the Desota. I never had a heavier crop. They yielded about bushel for bushel with the Rollingstone, after the pockets were taken off.

Pres. Underwood: Then you advise cultivating pockets? (Laughter).

Mr. Harris: Yes, in some cases. Sometimes, it takes the whole crop of the Cheneys.

VICE-PRESIDENT'S REPORT, SIXTH CONG. DIST.

MRS. JENNIE STAGER, SAUK RAPIDS.

In our district the extra early season and copious rains brought forward asparagus and other early vegetables and strawberries wonderfully, giving us good returns. The season of strawberries was very short, as all kinds seemed to ripen up at about the same time. Currants and gooseberries also did exceedingly well, ripening immediately after the strawberries. Then came the drouth, and our raspberries and blackberries were almost a complete failure. There were no apples of any account. Plums bore well. We were not troubled with blight on those trees which had blighted other years.

I have heard quite a number of persons say that Fay's was not a prolific currant; but last summer proved the contrary, as I never had the common Dutch bear any heavier.

Of grapes, we have had full crops and compact bunches of all kinds except Moore's Early.

VICE-PRESIDENT'S REPORT, SEVENTH CONG. DIST.

J. O. BARRETT, BROWN'S VALLEY.

Mr. President: I am not prepared with any paper at all. So far as my observation extends,I shall have to report quite unfavorably on all points. Probably,there was no part of the state where the drouth affected the mass of the people so lamentably as in my locality in Brown's Valley, in Traverse county, on the borders of the state just across from the northeast corner of south Dakota. You can form some idea of the condition of things so far as it applies to small fruits by the crop of wheat which we had, and on which we mainly depend. The average in my locality and in my vicinity, within a radius of fifteen or twenty miles, was but four bushels to the acre, and other crops yielded correspondingly. We had a very meagre crop of potatoes. But we live it through, for we are plucky and are determined to never say die. The crop of currants, I think, was reasonably fair, and so were goosberries. I cannot learn of any success worthy of mention in respect to strawberries. In fact, our people have become quite weaned from the experiment of trying to raise strawberries, for the reason, I believe, that proper preparation is not made by means of windbreaks and other necessary protection and proper cultivation of the soil. In coming here to this place I had a conversation with one of the residents of our county. I am familiar with his environments; he has protected his small fruits, and I am informed that he has made quite a success. He is a good farmer. Our raspberries are below par as to a crop. As to blackberries, I might say with safety, a total failure; as in other parts of the state, the ripening time is in the hottest part of the season—and you know something about the drouth—consequently, it was an absolute failure. I do not think there is any faith in trying to raise blackberries in that locality. In giving this rather sorry picture in regard to our attempts at raising small fruits, I wish to say that notwithstanding this state of things, our people are progressing by very slow steps. Our people take their failures as a means of learning the necessity of planting trees for protection against the terrible winds that sweep over us from the southwest. We have to fight every inch over and over again before we can waken the people to a right sense of what is necessary to be done, and it would be safe to say in conclusion that there is "A divinity which shapes our ends, rough hew them as we will." (Applause.)

EXPERIENCE WITH FRUIT IN SOUTHWESTERN MINNESOTA.

MARTIN PENNING, SLEEPY EYE.

(Extracts From a Letter.)

I will write you a report of some of my work and misfortunes in horticulture for nearly thirty years in Brown county. In 1865, after the great war, in which I had my share, I left Ozaukee county, Wisconsin, and come to Brown county,Minnesota, and have resided here ever since. When I came to this state, I was bound to raise fruit.

In Wisconsin, from 1848 to 1860,we raised German prunes and plums, some of them as large as small hens eggs. After 1860, timber got to be lighter—most of it had been cut away—so that plums and prunes could not be raised with any certainty in Ozankee county. I brought along scions of the hardiest plums, and topgrafted same on wild plum, but they proved too tender for Minnesota.

In 1869, I bought six Transcendent, and six Hislop crabs and two Flemish Beauty pears. Only four Transcendents and two Hislops grew, but after that we had a nice lot of crab apples for years. Then came the blight, and one by one they died until not one was left.

I always think much of plums; I had some Miner and Wild Goose plums that bore a few and then died. They were not hardy with me. Then the old Desota and Weaver came into market,and I bought six of each kind. They grew finely and were the first plums I had to stand the Minnesota winters.

In 1874, I bought fourteen evergreens, Balsam, Norway Spruce and Scotch Pine. I had no idea that such trees could be grown in Minnesota. Six of them grew, two Balsam and four Scotch Pine. I gave them the best of care, and they are today fine trees.

In 1872, I bought Houghton gooseberries and the Philadelphia and Turner raspberries. They grew finely and gave us lots of berries.

In 1874, I planted the first strawberries; they were Crescent and Charles Downing, and did well. I had about one-fourth of an acre, and sold the second year seventy-eight gallons of fine berries. I sold them by the gallon as there were no quart boxes at that time. I received sixty cents per gallon. I have raised some ever since. Every farmer ought to raise some, at least for his own family. They are as easy to raise as potatoes and corn.

Of black raspberries, I keep the Ohio, Mammoth Cluster and Shaffer. Small fruits and plums are my favorites. I have the following plums growing: Desota, Potawatomie, Peach, Rollinstone, Wyant, Cheney, Hawkeye, Black Hawk and my two seedlings, "Surprise" —the other is not named yet.

I sold last fall twenty-seven bushels of plums, the best at $2.00 per bushel, the medium at $1.50 per bushel and the smallest at $1.00 per bushel. They were mostly Desotas. The Desotas run down too small in a dry season, more so than any other kind. I will discard the Potawatomie, as they are small and not quite hardy. All the other kinds are hardy on my ground.

This is the second year I have joined the Horticultural Society, and I will stick to them. Every farmer ought to join them that is interested in fruit. The dollar invested in horticulture will give them more knowledge in one year than all the books they can buy. How nice it is to read those discussions!

My mind was to give up planting any more apple trees, but I have changed again since I read the horticultural reports. Last spring I planted seventy-five apple trees, mostly Russians, a few of which are Patten's Greening and Duchess No. 3. I set them six inches deeper than they stood in nursery row. I also set out Russian plums of the following kinds: Long Blue, Early Red, Minnesota, Hunt and White Nicholas. I begin to see into the fruit business, and I think we can

raise all we need, and more too, if we only get the right kinds. I set out last spring 1,900 plum seedlings, which I raised from my own pits, and will top-graft a good number of them. If I can procure scions, in a few years I intend to have more of the hardy plums.

Fruit is sparingly planted in southwestern Minnesota. The reason for this is that farmers were cheated too much by those smooth-tongued agents. I, for my part, lost over seventy-five dollars and have not one tree of them left. This is wrong and nothing but a steal out of the poor farmers' pocket.

SEEDLINGS AND NEW FRUITS.

J. S. HARRIS, LA CRESCENT.

Owing to causes beyond my control, I am not able to report very much progress in the work assigned me during the year 1894. Where not an entire failure, the apple crop was very generally light and the quality inferior. Very generally, seedlings that I had been following up during late years were not bearing so that I could secure typical samples of the fruit to aid me in further investigation, and I have learned of very few that fruited last year for the first time or that have not before been heard from. The number of really promising seedlings shown at the state and other fairs was not large. Samples sent by mail or express have been fewer than usual.

On these accounts I have not felt justified in making any extended trips over the state that would cause expense to our society.

At the state fair the Peerless and Okabena were shown by two or three parties, and they are now getting to be so widely distributed as not to require farther looking after by your committee. W. S Parker had on exhibition a variety that bore so great a resemblence to the Mollie, that originated with Mr. Gideon about the same time as the Wealthy and was by him discarded on account of blight and low quality, that I at first supposed it to be the same, and, as a member of the committee on nomenclature, placed that name upon the exhibit. Further investigation brings out the fact that it is really a good apple that will keep well into the winter, and Mr. Parker thinks the tree is more hardy than the Wealthy. Following is a brief description: Size, 5; form, round-conic, angular and ribbed; color, yellow shading to brownish blush on the sun side; stem, short in a broad, medium, greenish, angular cavity; calyx, open in a broad, medium deep ridged basin; flesh, rich yellow, nearly pink; flavor, mild subacid; season, winter. Probably a chance seedling.

Ditus Day, of Farmington, had on exhibition a variety named Falls Seedling. Size, 4 to 5; form, smooth roundish; color, yellow, mostly covered with stripes and splashes of dark red; stem, medium in a broad, rather deep cavity, somewhat russeted at the bottom; calyx, half open in a shallow basin; flesh, yellow, fine and tender; flavor, sweet, very good; season, September. Said to be a seedling from Northern Spy.

The apple that received first premium as best fall seedling was produced by O. M. Lord, of Minnesota City. It is a seedling of the Wealthy and much the size, appearance and quality of the Russian

Longfield. The tree seems to be a better grower than Longfield. At present it is known as Lord's. I saw at Mr. Lord's place one other tree, perhaps fifteen years old, that may be worth looking after. The tree is thrifty, sound and apparently very hardy and more exempt from blight than any other variety on the place. We have traced the tree back to its origin and find that it was raised from seed by Mr. Holt of Winona county and propagated to some extent by Mr. McHenry of the St. Charles Nurseries and proved the hardiest and only survivor out of a batch of 500. The fruit is really good in quality. Flavor, subacid, sweet; season, September.

In a trip through Houston Co., we almost accidently discovered four trees of an unknown variety, bearing a full crop of as beautiful apples as we ever saw. Should judge the trees to be about sixteen years old and without blemish. We learn they were procured from the nursery of Charles Waters, Vernon Co., Wis., as a new variety of seedlings. The fruit is most beautiful in appearance and keeps until January, but is not of high quality. It is locally known as Laylank Beauty?, but we have it under investigation and think it is the Kaighn's Spitzenburg, also known as Red Pearman, Long John, etc., that was quite a favorite in Ohio some forty years since.

Jacob Klein, of Hokah, has a large, fine, sweet seedling that fruited this last year. I shall watch it closely and if it shows evidences of extreme hardiness, will have it placed in our experiment station.

The largest collection of seedlings shown at the state fair was from my own place, but I would not like to say that any of them will prove to be the fruit we are so earnestly looking for. Some of them will never be shown again,as we considered them so near worthless for any purpose except to win state fair money that we have had them grubbed out to make room for others. The next largest collection was exhibited by George Miller, Rice Co. They were a fair lot, and, as they were generally produced from varieties of exceptional hardiness, we may reasonably hope for something valuable from them. I have seen the trees but not bearing,and several of them have good habits of growth and the appearance of hardiness, but they are not old enough to have passed through one of our test winters. Scions of the most promising have been furnished Mr. Dartt for the Owatonna station.

The Estaline crab, originated by O. F. Brand, has not been sufficiently noticed before. It is believed to be a hybrid of the Palmer crab. The tree is sixteen years old, an early and abundant bearer. We have seen the original tree in bearing and a two year old top-worked tree fruited in our experiment orchard last year. The fruit is rather larger than Whitney No. 20 and fully as good in quality. The tree is a much better bearer, and at Mr. Brand's place looks to be more hardy than the Whitney. An excellent apple was sent to us for a name from A. Wacklander, Blue Earth City, Minn. It does not correspond with any variety with which we are familiar and may be a seedling. The fruit is above medium in size, of good quality; season, late autumn. We only note it here for future reference.

Young's Greening was awarded the second premium at the state fair as the best winter seedling on exhibition. This variety origi-

nated in La Crosse Co., Wis. It stood well for over thirty years, and was known as a heavy fruiter and long keeper. The tree was growing on a clay bank in a back yard, and at that time was undermined and taken out. I secured two scions from it and worked them on the top of a Gen'l. Grant crab; they stand and bear liberally, and the fruit is fair in quality but rather small. C. G. Patten, of Iowa, sent us a sample of an Oldenburg seedling that is good enough to be worth looking after. It is of rather better quality than the Duchess, and keeps a month later. Joseph Marshall, of Washington, Fillmore Co., has a new seedling. The fruit is about the size of and as beautiful as the Jonathan; season, October and later. He writes that the apple appears to be perfectly hardy.

NATIVE PLUMS.

A number of packages of native plums were sent us by mail for examination. The first was received on August eighth, from August Wittmann, St. Paul. They measured one and one-fourth inches in diameter and one and three-fourths inches in length. The color is a deep red, covered with a whitish bloom; the skin is rather thick; flesh medium soft; flavor very good. It will keep several days after being picked, and is so early and handsome that I should think it would be valuable for market. On the eighteenth of August, Mr. Wittmann sent us another variety, a round plum, one and three-eighths inches in diameter, of better quality than the first. Four days later we received another variety, large, and oval, yellow with red cheeks; flesh yellow and sweet. We understand they are seedlings, and all of them are better than the wild plum of the groves; we are informed that, owing to the drouth, they are not as large as they usually grow.

On August twenty-third, we received samples from W. C. Northrup, Red Wing, Minn. Average size, thirteen-sixteenths in. in diameter, one and seven-sixteenths in. in length; form, oval; color, yellow, shading to light red and deeper red on same specimen; skin, thick; flesh, orange-golden; flavor, pleasant; stone rather large, medium thick; cling.

On August eleventh, five varieties were received from Thomas Frankland, Manitoba. In size they ran from medium to small. Two of them were of excellent quality and nearly freestone and might prove valuable to us on account of earliness. They would very likely grow larger with us. A sample of the Cheney was sent with them to show their comparative earliness, and, I should judge, they were from two to three weeks earlier than that.

At Mr. Widmoyer's, Dresbach, we saw a seedling plum that seemed to possess considerable merit. It is a medium large, round plum; color, yellow shading to salmon and red; skin, thin, separating easily from the flesh when fully ripe; flesh, yellow. A very good plum.

Piper's Peach was examined August twenty-third. It is a large, round, red plum, which is covered with a thick, bluish bloom. The flesh is a deep orange-yellow, of good consistence and of very fine flavor; the stone is round and thick. The tree fruits rather shyly this year. If it proves to be a good bearer, it is one of our very best plums. It is a healthy, strong grower.

August twenty-eighth, we received three varieties from L. S. Gjemse. All very good size, medium to large.

On September twenty-seventh, received from L. E. Austin samples of one variety, full medium size; color, yellow ground, mottled red, irregular yellow spots showing through the red—a very handsome fruit; the flesh is orange-yellow, firm, juicy; flavor much like Damson; has a small, thick, round stone; leaf resembles the Chickasaw family. The tree is said to have been found in a wild grove in Chippewa county.

On October fifteenth, we received samples of the Golden Beauty from Chas. Luedloff, Carver, in very good condition after they had been picked two weeks. It is a medium sized, oval, golden-yellow plum that seems to be proving hardy with Mr. L., and may have great value for crowning with some of our best natives.

In the strawberry season we made a trip to Sparta, Wis., to examine a new seedling strawberry originated by L. Herbst. The variety appears to be very promising. The plants are robust and healthy. It is said to be a seedling of the Warfield crossed with Jessie. The fruit is large, of the most perfect form and of a dark glossy red color. The flesh is firm and of excellent quality and has the marks of being a good shipper. Some fruit we carried home with us was in perfect condition four days after picking. It is a perfect flowering variety, ripening nearly with the earliest and continuing to bear a long time, and from the result of a few rows we saw in a Warfield plantation,it appeared to be a potent pollenizer and admirably adapted to grow with that variety or any of the earlier pistillate varieties. Its size, color, uniformity of shape and productiveness promise to make it a popular variety. It was first placed on exhibition in competition as best new seedling at the summer meeting of the Wis. Hort. Society at Kilbourn City, in 1893,and was awarded the first prize over a number of strong competitors.

DISCUSSION.

Pres. Underwood: This report is now open for discussion. If any one has a question to ask on the report, we would be glad to hear from them.

Mr. Wedge: I do not know whether it would be a matter of interest, but there are some seedlings originated by Mr. Mitchell, of Cresco, Iowa, which, it seems to me, are not receiving all the attention they deserve. I have some of them on trial at my own place, and they are as promising as any seedlings I have found anywhere. The fruit is fine. His Red Warrior is a finely colored apple, hardy in growth, and it seems to me should receive more attention in Iowa and Minnesota than it has heretofore had.

Mr. Kimball: How is the Red Warrior as to blight?

Mr. Wedge: I cannot say as to that; it is in an exposed place. The trees ripen the wood reasonably well, and I am going to

have some test of hardiness this winter; all fruits and apples took on a second growth on account of the wet weather we had in September, and many varieties are in bad shape for this winter.

Mr. Harris: I did not make any suggestion or recommendation about that committee. I know it is tedious for you people to sit and listen to a description of these things. I think it is of interest to trace out the new varieties, and I hope you will keep the committee going, and I hope the state will see the necessity of this some day, so the society can prosecute the work with a little vigor. I have not brought any bills into the society for two or three years, but I am at considerable expense. I think the committee had better be kept up, and I think you had better make some show on the books as though you were going to have some pay some time or other.

Mr. Dartt: Does that report recommend anything?

Mr. Harris: I think the last report recommended that not more than $150 a year should be expended in exploring these things, but there was nothing to explore.

Mr. Dartt: I believe it is a grand, good thing to make these explorations, but I believe they should be confined entirely to Minnesota and Minnesota seedlings. I think the natural tendency with us is to run after strange gods. Now, in my opinion, the great bulk of seedlings that are produced all over the country are entirely worthless—the great bulk of them—and especially those produced in favorable localities, such as Wisconsin or Iowa. I do not doubt but marked good may come out of Wisconsin and Iowa in some of those seedlings, for some of them are just as good as we grow ourselves, but I know for a certainty that a great many of the seedlings that have been produced in Wisconsin for the past twenty-five years are not hardy enough for Minnesota. Now, the fact that those seedlings are producing fruit at the present time and seem to be hardy is no test at all. We have not had a hard winter since 1884 and 1885. We have not had a test winter since that time; and this favorable trick of the weather enables trees that are not naturally very hardy to produce fruit, and they may produce fruit as long as the conditions for so doing are favorable. I think we should be a little more restrictive in our recommendations. We should find out a little more definitely about their hardiness and be less active in our effort in reaching out after things we know not of. That is my opinion, and it does not seem to me that it is best to make any great effort in getting

things from abroad, especially unknown seedlings. We have a great many seedlings from Iowa and Wisconsin. We have those trees on trial, and if they bear fruit, and the fruit is of good quality, and the trees are productive and perfectly hardy, and we have evidence of the real value for Minnesota, it would seem to be time enough then to bring them prominently before the public; and if we do it before then and they prove otherwise, our labor is lost.

Mr. Wedge: I would like to ask Mr. Dartt if Patten's Greening ranks with the Hibernal and Duchess.

Mr. Dartt: I can answer that without getting up. It does not; the Hibernal did the best of any tree in the experiment orchard.

Mr. Wedge: It does not look as well as the Duchess?

Mr. Dartt: No, it does not look as well as the Duchess.

On motion of Mr. Brand the report of Mr. Harris was adopted.

Mr. Wedge: It seems to me Mr. Harris is doing a great deal in the line of looking up fruits, and is doing it without any compensation. It is no more than right that we as a society should express our appreciation of his presistence in this matter. I move we tender him a vote of thanks for looking up seedling fruits.

Mr. Brand: That reminds me of what the old soldier said during the pension agitation: "I would rather have an ounce of taffy while I am alive than a ton of epitaphy after I am dead." I wish to amend that motion by saying that we pay Mr. Harris $25 for his services during the year.

Mr. Wedge accepted the amendment and the motion prevailed.

Mr. Harris: This is entirely unexpected. While I do a great deal of work for nothing, I am willing to do it if my work is only appreciated, and I will buy myself a new suit of clothes or do something with the money to show that I remember your gift.

Mr. Ferris, (of Iowa): Mr. Brand told a little story, and that reminds me of a story. A doctor was called by a farmer to go out into the country some four or five miles. It was a stormy, disagreeable night, and the roads were in a terrible condition. The doctor staid all night, and in the morning the man asked him, "How much do you charge?" "Well," said the doctor, "the roads are bad, it was a hard trip, and I will have to charge you five dollars." "All right," said the farmer, "I have no money now, and the fact of the matter is I don't know whether I can ever pay you, but you can rest assured of one

Mr. Dartt: Is that list before us for discussion?

Mr. Harris: Why, yes; I suppose you can discuss it if you want to.

Mr. Dartt: I move the Wolf River be stricken off.

Mr. Harris: I would not recommend that. This is only for discussion.

Mr. Dartt: I made that motion hoping I would get a second. If I had made a speech, I might have interested somebody enough to second my motion. As I understand it, that is a Minnesota list.

Mr. Harris: No, sir; it is not.

Mr. Dartt: Well, if it is not a Minnesota list, I don't know that I have anything to do with it. If it is a Minnesota list, I would not recommend anything that would not grow in Minnesota.

Mr. Harris: If he is going to restrict us to fruits that are successful in Minnesota only, what chance have we to find out what there is outside of the fence?

Mr. Barrett: If I understood Bro. Dartt—he and I sometimes cross each other—he seems to imply in his statement that the Wolf River is not to be recommended. If that is the position assumed in reference to that tree, I shall have to defend it.

Pres. Underwood: This is merely a discussion; it does not carry with it any recommendation.

Mr. Dartt: He said it was not good for anything, and I thought we should not have anything of that kind on the list.

Mr. Richardson: In our section of the state there some men who are raising Wolf River and think they are way ahead of the Wealthy. If they cannot get them there, they send to Wisconsin for them. There are Wolf River trees just north in the county of Blue Earth, and they are as good as any I ever saw.

Mr. Harris: I think we should spend some time, or rather have a committee at every meeting to spend some time to change the ratings, something on the plan of the American Pomological Society in their catalogue. The secretary there reads one item at a time, and any one is at liberty to recommend any change he sees fit to suggest. The catalogue makes a list of the varieties that are worthy of cultivation somewhere in the country; and I think it would pay us to reserve our catalogue and publish it once in two or four years, and each time before we publish it make these ratings correct. One man can not make a rating that will suit everybody. In regard to the

quality of an apple, if I should say it was No. 1, Mrs. Kennedy would say it was horrid.

Mrs. Kennedy: She would if she thought so. (Laughter).

Mr. Dartt: If the report does not mean anything, it is not worth anything. If it does not suit us, it ought to be revised and talked over until we know what we want.

Pres. Underwood. As I understand this report it does not recommend the varieties we should plant in Minnesota. It is simply a description of the different varieties. You can adopt it if you want to, or you can receive the report or refer it to a committee. It is not a recommendation; it is simply a report.

Mr. Dartt: I move the report be received and placed on file.

Mr. Brackett: Does that mean that it is supplemental to the old report?

Pres. Underwood: There was in this report a suggestion by Mr. Harris that the list be revised and published in full. It is not necessary to take any action on this at all.

FRUIT BLOSSOMS.

O. F. BRAND, FARIBAULT.

I am one of the great multitude who are too busy with the every-day cares of life to afford time for unrewarded scientific investigation. Particurlarly is this true at the time it is necessary to study fruit blossoms. I *took* time last spring to note a few facts with reference to them.

Trees went into the winter in December, 1893, in fairly well ripened condition. There was no winter weather injurious to them, there being no extreme cold weather. A warm wave struck us about the last of February, continuing up to March the 17th. The frost was all out of the ground before that date, and considerable plowing was done as far north as Wadena and Verndale. The temperature raised to 83° above at Faribault on March the 17th, followed by lowering temperature and rain all day on the 18th, with 6° below zero on the 27th and quite a snow storm. Grass did not begin to look green till April 16th.

Inasmuch as fruit blossoms and fruit are the result of *weather* and of the *right kind* of weather, our fruit crop having been (with the exception of plums and a few small fruits) a failure, I have concluded to give a record of the weather as taken down from day to day during and after and before the blossoming period, believing that the only advantage or value to be had from this report lies in a knowledge of the conditions under which the blossoms were developed.

My first record of fruit buds was made April 15th, and reads:

April 15th. Transcendent buds began to swell; followed by a cloudy day and rain on the 16th.

April 16th. Temperature 60° above.

April 17th. 70° above with heavy showers after 4 p. m.

April 18th. 76° above, showery; sunshine and clouds; wind south.

April 24th. Duchess buds the size of large peas, and about ⅛ to 1/16 of an inch of green can be seen in the expanding buds.

April 26th. Transcendent trees begin to look green at ten rods distance; 74° above.

April 27th. Cloudy till about 4:30 p. m.; light shower at 12:30; 70° above at sundown; wind S. W.

April 28th. Cloudy; east wind; temperature about 70°; heavy showers in the evening.

April 29th. Wind east by southeast; cool and cloudy. An *unusually heavy shower* came up from the west by southwest about 6 p. m. doing great damage to hillsides. High wind accompanied the rain.

April 30th. First strawberry blossom, and first red seen in Duchess blossoms.

May 1st. Drizzling rain nearly all day; very high wind about 2 a. m. with heavy rain.

May 4th. Cheney plums in blossom; wind north; changed to south in afternoon; 68° above; thunder at 7 p. m.

May 5th. A number of wild plums in blossom; thunder by spells nearly all night with little rain. At 3:30 p. m. the worst hailstorm I have ever witnessed struck us from the west by southwest and lasted twenty minutes.

May 6th. 56° above at 11 a. m.; strong west wind; fleeting clouds.

May 7th and 8th. Spraying with Bordeaux mixture.

May 10th. 56° to 48° above; cold wind.

May 11th. 70° above at noon; strong southwest wind; some of the petals of the Transcendent falling; Duchess blossoms begin to open in large numbers; spraying.

May 12th. Bees plenty and busy in blossoms; the center of nearly all Duchess open on trees southwest of house only; few are to be seen among the other Duchess; some clusters southwest of house entirely open; 66° above at 10 a. m.; wind southwest; spraying. *Very light* frost in places two mornings this week but no injury from it appears in the blossoms.

May 13th. Petals of Orange crab falling freely; 64° above at 6:30 a. m.; thunder clouds; 79° above at 10 a. m.; 85° at 3 p. m.; warmest noted since March 17th; considerable south wind; Duchess, Estaline, Briars Sweet and Quaker Beauty in full bloom. First blossom on Peerless opened yesterday. Peerless and Wealthy appear to be about alike this year in time of blooming. Crescent strawberry in full bloom.

May 14th. Transcendent bloom nearly all fallen. 64° above at 6:30 a. m.; 74° above at 11 a. m.; 86° above at 3 p. m.; cloudy, wind south by southwest; low bank of clouds in west and southwest and northwest, with thunder and lightning all the evening.

May 15th. Very heavy rain and thunder from 4 a. m. to 6 a. m. with strong southwest wind; 67° above at 6 a. m.; blossoms nearly all fallen.

May 16th. Peerless in full bloom. 64° above at 6 a. m.; 80° above at 6:30 p. m.; wind, south; cloudy in the morning. Dark clouds from northeast around north to southwest. Very sultry from 9 a. m. with a hazy and misty atmosphere in the afternoon. Reports of bad hail-storms at Rosemount and other points yesterday morning. Spraying with London purple.

May 17th. Spraying. Temperature 58° above at 6 a. m.; clear, wind east by southeast; 68° above at 9 a. m.; hazy clouds, northwest; 62° above at 3 p. m.; 10 a. m., low dark clouds, southwest, west and northwest; 3 p. m., wind northeast; 3:20 p. m., blowing a gale from north-northeast, 58° above, dark and cloudy; 4 p. m., 56° above; 5 p. m., 50° above and raining, wind northeast, thunder.

May 18th. 40° above at 8 a. m., strong north wind; 52° above at 2 p. m., a few white, fleeting clouds whirling in their rapid flight south; 44° above at 8 p. m., clear, light breeze from north-northeast.

May 19th. Frost; 32° above in the lower part of the orchard at 5:30 a. m.; considerable white frost and also dew on the grass; clear; light breeze from the north. At 5:45 sprayed a few Duchess trees with cold water. 54° above at 11:30 a. m.; 50° at sundown and 48° above at 8 p. m.; clear; wind, northwest.

May 20th. Full moon, frost, grape vines on lowest ground, which had made a new growth of 12 inches, are killed, while on higher land on trestles they were partially killed. 36° above at sunrise, 57° at noon, 61° at 3 p. m., 52° at 7:30 p. m.; wind strong, nearly north; clear.

May 21st. 40° above at 6 a. m.; clear; clouded up from the east about 9 a. m. with wind north by northeast. Spraying orchard with London purple.

May 22d. Cloudy; spraying; 48° above at 9:30 a. m.; wind northeast.

May 23d. Sprayed plum trees with London purple and a part of the apple trees with Bordeaux mixture. 60° above at 1 p. m. and 53° at 8 p. m. The leaves of apple trees show the effect of the late frost.

May 24th. 70° above at 11 a. m.; clear; wind northeast all day.

May 25th. Clear with variable, floating white clouds; wind northwest; 80° above.

May 26th. Clear till about 11 a. m., then a smoky, cloudy, variable atmosphere; 84° above at noon; sultry, wind south; 72° above at 5 p. m. At 5:15 p. m. the wind suddenly shifted to the north with a shower of rain and hail at 6:40 p. m., and temperature 52° above.

May 27th. Clear; wind north; 58° above at 11 a. m , 46° above at 8 a. m., 52° at 8 p. m.

May 28th. A very little frost to be seen in low places.

May 30th. Clear; 44° above at 8 a. m.; wind east by northeast.

June 1st. Finished spraying today.

For a number of days the young fruit has been shrivelling. I attribute it to unusual and extremely unfavorable atmospheric conditions as indicated by the above record. I will give no more of the record, except that on June the 8th, rye stood five to six feet high, and we drew in new hay of bluegrass and clover. The new growth on two year old Peerless trees measured twelve inches in a great many instances About blight, it reads as follows: Most of the old

crab trees look as though fire had run over them. The Tetofsky Charlamof, Patten's Greening and Hibernal are in the same condition. I *never* have seen my crab trees look so bad.

A frequent examination of apple and plum blossoms during all their stages of growth up to the time the petals had all fallen, revealed to me no insight into the disaster that followed,and I am now compelled to attribute the total failure of our apple crop to the unpropitious weather at and during the period of pollenization and immediately after, and to the almost total inability of the bark and leaves of the tree to properly assimilate inorganic matter,"for as on the one hand very slight changes in the conditions of life are favorable to plants, on the other hand certain other changes cause sterility." The amount of cold that certain varieties can stand uninjured in cellular structure under certain conditions is only *one* point in *many* which go to make up its adaptation to a certain climate. This was very forcibly illustrated last spring by the Transcendent and other crabs suffering much more than did the Oldenburg. The Peerless suffered much less than the Oldenburg, while the Euranda crab was the only crab I saw last summer bearing a heavy crop of fruit in this section. Whether it was in the blossom itself or the constitution of the tree that preserved its fruit, while the fruit of Duchess of Oldenburg and all other trees in its immediate vicinity was destroyed, I am unable to say; but it, certainly, is a case where natural selection has manifested itself unmistakably. I leave the subject of cross-fertilization to the other and *abler* members of this committee.

In closing this very unsatisfactory report I would recomend that this society appropriate the sum of one hundred and fifty dollars *annually* for the next five years, to be paid to three different persons under proper restrictions, who will each devote five days during the blooming season of apples in taking observations and in making such crosses as their judgment will recommend and opportunities permit. This work has been too long delayed. In the opinion of such men as Darwin and Marshall P. Wilder it is the *surest* and *most certain* way to give us a large class of thoroughly acclimatized, high class, late keeping winter apples. Let this society prove itself worthy of the name it bears! The work intended must be done during one of the most busy seasons, viz., *spring's work*, during which season every *minute* is precious. It must be done by those who are qualified by nature and practice. Let me call your attention to what has already been done by cross-fertilization, with roses, grapes and strawberries. We do not know where the limit may be; we do know that it is the right and only sure road to speedy success.

DISCUSSION.

Mr. Barrett: There is one thing in this report that certainly commends itself to me, and it occurred to me that it would be a good plan to require every vice-president and such others as may be appointed to make reports, to take observations from day to day and make reports of the changes of the weather,

of the winds, etc., and report at each annual meeting, to be placed on record and published in our reports. Such reports would be of incalculable benefit to us. We are making the history of the Northwest, and if we had such a report it would be an admirable reference for the purpose of comparison between the present and the future. I would, therefore, like to ratify the motion that our vice-presidents make similar reports at our annual meeting.

Pres. Underwood: Do I understand that you make a motion to that effect?

Mr. Barrett: Yes, sir; I make that as a motion.

Mr. Harris: If I understood it right I will second that motion, that is, to make it the duty of vice-presidents to make such reports. In other words, let each vice-presidents make observations in his or her locality or district, and let it be defined as one of their duties.

Pres. Underwood: The motion is to the effect that it be required of vice-presidents to make it one of their duties to take observations within their respective districts and report them at our annual meeting, similar to the report just read.

Mr. Dartt: I do not want to make a speech, but it occurs to to me that for every one of them to make a report of the weather, of the winds and other atmospheric conditions would be a great deal of labor, and it would not be of any great value. We must take the weather just as it comes along year after year, and there will not be difference enough between one spring and another spring, and one summer and another summer, to make it worth while to report. I do not know whether these calamities come through the weather or through some other source, and we had better not blame the weather for everything. It may not be to blame so much after all. If they were required to make such a report, I do not know what it would accomplish.

Pres. Underwood: Would it not be well to leave this in the nature of a suggestion instead of defining it formally as the duties of these officers? We would like to hear from Mr. Brand.

Mr. Brand: Tomorrow the duties of the officers are to be considered. Let us wait until we are considering the duties of the vice-presidents.

Mr. Barrett: I will withdraw my motion. I should like to say one word, however, Mr. President. If a motion of this kind should prevail before we close our session, it would tend to educate our vice-presidents and others to the observation of

the changes in the weather incidental to our climate, and that certainly would be of value enough of itself; it would be a very interesting and valuable addition to our annual reports. The reports of such observations should be required to be as brief as possible, so as not to occupy too much space. Such reports would certainly have the effect of affording us the opportunity to better judge what would be the probable result of the changes in the weather, and we could govern ourselves accordingly as to the conditions we should be compelled to meet. I will not be strenuous in regard to the matter.

Mr, Moyer: I think the weather is pretty well covered by the weather bureau.

SPRAYING AT THE UNIVERSITY FARM.

R. S. MACKINTOSH, ST. ANTHONY PARK.

During the past season considerable attention was given by the division of horticulture to spraying, both for killing destructive insects and for fungous diseases. Spraying is becoming a very important factor in our work, and should be better understood and appreciated by fruit growers generally. If you read the agricultural press or bulletins from the Department of Agriculture or experiment stations, you will find in them in most cases something relating to spraying. It is now an unquestioned fact that spraying when done at the right time and in the right way will not only increase the yield but also keep the trees and vines in a healthy condition. Spraying is now practiced not only on small fruits and field crops but, also, on fruit and shade trees.

When we started out for the summer conflict, about the first that we had to consider was the apparatus to work with. The outfit consisted of a common force pump attached to a barrel that was fastened on its side to a stone boat. The entire rig was made so that it could be either hauled on the ground, as is a stone boat, or put into a wagon and hauled from place to place. One or two hose with nozzles were used,depending upon the kind of work. The outfit worked very satisfactorily, though some changes might be made which would make it more easily handled. The nozzle that was found to do the best work under all conditions was the Bordeaux, manufactured in Salem, Ohio. As a rule, this season plants were not troubled as much as usually with fungous diseases, due to the excessively dry weather; however, considerable spraying was done in anticipation based upon previous experience.

Nearly all of the strawberries were sprayed with the Bordeaux mixture on May twenty-third. It appeared afterwards that there was very little leaf blight upon them, consequently, it would have been as well if the spraying had not been done; but it is far better to be on the safe side.

The raspberries were sprayed with the Bordeaux mixture to prevent the anthracnose, which had done some injury to the canes the

previous season. Some injury was done to the leaves on the old canes by the Bordeaux mixture; the leaves on the new wood were not harmed. The results from the spraying of the raspberries would indicate that it was beneficial. In the vineyards large numbers of leaf-hoppers appeared during the season. Applications of kerosene emulsion were made, as well as other methods of destroying them. We first began to apply the emulsion during the latter part of June. Large numbers were destroyed in this way, but as they multiplied very rapidly, it seemed almost out of the question to check them at so late a time in the summer.

Considerable time was spent in spraying a plat of potatoes in different ways with Bordeaux mixture to prevent the early and late blights. As regards the early blight beneficial results followed, while for the late blight results were in favor of rows that were sprayed, but as there was little late blight the results would not be conclusive.

During the past year the price of Paris green has been high, due to the fact that there is a trust that controls it. If further investigations prove successful, we may not care whether a trust controls it or not. The Massachusetts station has found that mixing eleven ounces of acetate of lead, two ounces of arsenate of soda and 150 gallons of water makes a very effective insecticide. The points in favor of this insecticide are that it can be easily seen on the leaves, is soluble in water, making it sure of being distributed evenly, and it does not burn the foilage unless used very strong.

DISCUSSION.

Pres. Underwood: This is a very importnnt subject and I would like to hear it discussed.

Mr. Brackett: How do you consider the Bordeaux nozzle compares with the Vermorel?

Mr. Mackintosh: I like the Vermorel very well, but the Bordeaux is arranged on a different plan; you can adjust it in any way you desire.

Mr. Dartt: How do you control the nozzle?

Mr. Mackintosh: By turning the flange on the side. it throws the stream through a round hole, but it strikes the surface and throws it in different directions.

Mr. Crane: Can you kill the leaf-hopper with Paris green?

Mr. Mackintosh: You can, but it is rather difficult.

Mr. Brand: Have you considered any particular mode of procedure at the station for the coming season?

Mr. Mackintosh: No, I don't think we have. As to the leaf-hopper, from reading reports of the life history of the insect I think it could be more easily destroyed by keeping no brush around the place over winter; if we destroy the rubbish there will be no place for them to stay.

Mr. Crane: Can you give a description of the leaf-hopper?

Mr. Mackintosh: It is a little brown insect on the under side of the leaf, and when disturbed it will hop or fly away.

Mr. Brackett: It is more gray than brown; its relative size is considerable smaller than the mosquito.

Mr. Dartt: I was about to say I had had considerable experience in spraying; I do not know whether my experience will be of any benefit to you or not, but it might be better than nothing. I have worked on that matter for two or three years. I have a force pump attached to a kerosene barrel, and I have a horse and what I call my apple cart; it is a wagon built on purpose to haul apple crates around, and it is so arranged that I can guide the horse between the rows. I go along and drive, and somebody else does the pumping, and that is the way we do our spraying. I have sprayed just after the blossoms fell, and in my old orchard I got a very full setting of apples, so heavy that they were small, they were diminished in size. Where I sprayed later I did not have so many apples, and it was a question with me whether spraying was a benefit, whether if I had let the insects destroy, at least, a part of them, it would not have been better. But I sprayed again the next year, and last summer I sprayed lightly, and there were few blossoms. This last season I sprayed all of my trees; I used Paris green. At first I used blue vitriol and mixed it with alkali, but the alkali cooked the blue vitriol and did not mix, so I stopped and took Paris green; it mixed readily. I do not know whether the concentrated lye killed the force of the Paris green or not, but I sprayed in that way, and I really do not know whether the spraying did a great amount of good or not; but I know this, the trees I sprayed have a remarkable healthy look, and they carried it all summer long. Of course, there was this twig blight; the trees blighted so that it diminished the crop of fruit wonderfully, but still I had quite a little crop of apples; perhaps, one-fourth of a crop, may be less than that. I sold 575 bushels of the Duchess. I am going to spray next year; I have so much faith in it, I shall spray all my trees. I think the spray pump should be kept at work, and I am going to spray.

We were speaking about mulching trees. I have had a man running a team since late in the fall hauling manure into the orchard and spreading it around the trees. In one orchard I have had it spread all over the ground. In another orchard I have had it put around the trees, and when we come to cultivate the trees we shall mix it in the soil, and I shall give it the

best of cultivation. Wherever I have seeded down an orchard the trees have done poorly, and I am not in favor of seeding down; if an orchard is closely planted and heavily mulched, it may be all right, perhaps, and just as well as cultivation. Perhaps, I can say nothing else that will be of profit to any one, and I do not like to talk unless it pleases myself or somebody else.

Mr. Mackintosh: What kind of alkali do you use?

Mr. Dartt: I use concentrated lye.

Mr. Mackintosh: What proportion do you put in?

Mr. Dartt: I do not dare to put in over a quarter of a pound to forty gallons, or a barrelful, of the mixture. I used about a quarter of a pound of Paris green.

Mr. Mackintosh: Do you use any lime?

Mr. Dartt: I do not use any lime. I did when I used the blue vitriol.

Mr. Brackett: Would there be any peril if you should increase the amount of poison?

Mr. Dartt: There would be no peril, but it would spoil the fruit. I have tested that matter of injury to the trees. I have sprayed the trees so that the mixture would drip from the trees into the grass; I have mowed the grass and fed it to the horse, and it did no harm; and it has been gathered on sheets and analized, and the chemists have agreed that a person would have to eat a barrel of apples at a time in order to be poisoned (laughter).

Mr. Brackett: Will this subject of mulching come up for discussion at any time during the meeting?

Pres. Underwood: I think it will come up later; we had quite a little of it this morning.

Mr. Brackett: What was the concentrated lye put in with the Paris green for?

Mr. Dartt: To do the trees good; to make them grow; to make them fat.

Mr. Wedge: Is that leaf-hopper that injures the grape vines the same that works in nursery apple trees, the box elder and a great variety of trees? At my place it commits very serious depredations: It retards the growth of my apple trees at least six inches. It almost ruins the birch, and it reduces the growth of the box elder one-half.

Mr. Mackintosh: I cannot say definitely; there is a whole family of leaf-hoppers, and I think it first cousin to the one that bothers the grape. I would have to refer you to Dr. Lugger for anything more definite.

Mr. Dartt: I would like to have Mr. Brand explain a little in regard to his spraying. I noticed he said he sprayed before the blossoms were out.

Mr. Brand: As we had no results from the crop of fruit the past year from spraying, I have not given the thing much thought, but my reason for spraying before the blossom was open was for the purpose of killing the insect that causes scab on the apple. As soon as there is the least sign of growth on the apple tree an enemy attacks and feeds upon it. Just as soon as the least tip of green is to be seen this insect begins to feed upon it, and that was the reason I sprayed so early.

Mr. Dartt: Would you not think that adding this concentrated lye would help the growth of the trees?

Mr. Brand: Yes, I think it would.

Mr. Dartt: Do you know how much you could add with safety?

Mr. Brand: No, I do not.

Mr. Mackintosh: What formula do you use for preparing the Bordeaux mixture?

Mr. Brand: I have forgotten. I am not good in keeping those things in my head.

Mr. Dartt: Has any one used salt as a preparation to spray with?

Mr. Harris: Salt is good to catch birds with. (Laughter.)

Mr. Dartt: I have tried it a little, but do not know how much to use.

Obituary.

JOHN JACOB THOMAS,

Died February 22, 1895.

It is with regret that we are called upon to record the death of another distinguished horticulturist, that of John Jacob Thomas, which occurred at Union Springs, N. Y., Feb. 22d, at the ripe age of 85 years. Mr. Thomas was a co-editor of the "Country Gentleman and Cultivator" for more than half a century, and a liberal contributer to the horticultural literature of this country, and for a time a nurseryman at West Marion, N. Y. Through these means he became widely and favorably known throughout the whole country. He was one of the founders of the American Pomological Society and a co-worker with the venerable Marshall P. Wilder, Charles Downing and Patrick Barry, all of whom have departed after long lives of usefulness, venerated by every period of pomology in our country and Europe. They have left us, but their light has not gone out, but will shine on until the end of time, an influence that is stimulating young men to follow in their footsteps and make the world brighter and better.

J. S. HARRIS.

May Calendar.

THE ORCHARD.

J. S. HARRIS, LA CRESCENT.

In an early season like the present, the planting of trees should, in general, be finished before the first of May. In all cases where it is yet to be done extra pains must be taken to prevent the exposure of the roots while they are out of the ground, and the greatest care taken to get fine, moist soil in contact with every spot on the roots and make it firm about them. If the foliage is started, the trunks and large branches should be wound for a few days with cloth or hay bands or paper bound about them to prevent too rapid evaporation before the roots begin to draw upon the soil. The scald too often starts at this period. Soaking rains and high winds often get newly planted trees leaning away from the 1 p. m. sun. They should be looked to and straightened up after every such storm, and such as are weakly rooted had better be tied to stakes.

Mulching should be applied early—or if material for the purpose is not at hand keeping an inch or two of the surface soil fine and loose by raking after every rain will answer a very good purpose.

Insect life comes with the warm growing weather; look sharp for canker worms and tent caterpillars. Whenever a tent of the latter is pitched it will show in the morning while the dew is on; take the tent while the whole family is at home and crush it under foot. Spraying with a solution of Paris green, about four ounces to fifty or sixty gallons of water, just after the blossoms have fallen and, again, two weeks later, is a good remedy against the canker worm and codling moth, and some help against the apple gouger and plum curculio; but jarring the trees and letting the insects fall upon sheets spread under to catch them is more effectual if the latter are caught and killed or burned.

Planting in Orchards. While the orchard is young, it is best to cultivate it thoroughly, and hoed crops, like potatoes and beans, that mature by the first of August may be grown as a crop to part pay for use of the ground until the orchard begins to fruit. Squashes are a good fruit crop in the young orchard.

FRUIT GARDEN.

Strawberries are better for being set early, but they may be set with considerable certainty on cloudy days when the soil is moist, all through this month. All blossoms and fruit that appear on the new plantation should be removed. They should be kept clean from

weeds and stimulated to early growth by cultivating or raking the ground over, to keep the surface soil fine and mellow, as often as once a week. The fruiting beds should be kept clean from weeds and well mulched between the rows to keep the fruit clean. That fruit which is sent to market should be picked carefully into clean boxes, gaging the degree of ripeness by the distance they are to be transported. For near market, it should be fully ripe enough for use; and for long distance, it should be full grown and well colored before picked. Every berry in a box should be of one grade and degree of ripeness.

The currants, gooseberries and raspberries should be well cultivated and a little later mulched with green clover or other material. It pays to pinch off the ends of the new canes of black raspberries as soon as they get two to two and one-half feet high; but the red varieties should not be pinched or cut back during the growing season. Keep the sprouts thin enough to insure strong cane.

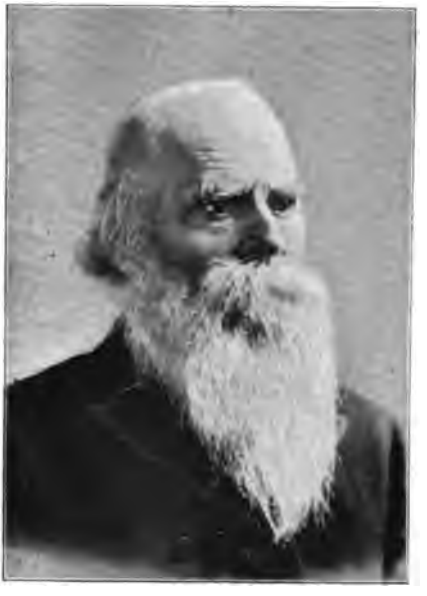
Grapes. One healthy vigorous cane to a root the first year after planting and two the second year. Fruiting vines should be kept tied up securely to supports. Generally, it is an advantage to stop the fruit bearing canes of the present year, that is,have their further growth in length prevented by pinching off the point leaving three leaves beyond the last cluster of fruit. This should be done early, and surplus suckers removed. If done after rank growth is made, the vine is weakened and more liable to attacks of mildew and rot and the fruit made later in maturing.

VEGETABLES.

In the kitchen and market garden, work is now on with a rush. Keep the asparagus beds clean from weeds and, during the cutting season, cut as often as the shoots become long enough for use, and do not leave the small and crooked roots to grow. Lima beans had better not be planted before the middle or last of the month, and it is generally better not to risk all the tomato, egg plant and peppers, until about the twentieth of the month. Early beets and carrots should be thinned and weeded out, and cabbage, cauliflower and other early vegetables hoed and cultivated every week.

SPRAYING

Will be commenced at the tree station the coming season. In my own orchards of over 3,000 trees, I have practiced it for the last three years, using one-fourth pound Paris green to about forty gallons of water. Last season I added about one-half pound concentrated lye to each forty gallons, with seemingly beneficial results, as the trees took on a remarkably healthy look. I am unable to say how much I gained by spraying, as I spray all my trees, but I have so much faith in it that it will be continued. It is thought best to spray as soon as blossoms fall and once or twice more at intervals of ten days or two weeks. I think, next spring I will spray once before the buds open, in which case I will use a much larger proportion of the lye, as there will be no foliage to be harmed. Alkali promotes the growth of trees. E. H. S. DARTT, Owatonna.



John H. Stevens.

MINNEAPOLIS, MINN.

(For biography see page 199.)

THE MINNESOTA HORTICULTURIST.

VOL. 23 JUNE, 1895. NO. 5.

SPRAYING SUMMARY.

FROM MARCH 1895, BULLETIN NO. 86, CORNELL UNIVERSITY, PROF. E. G. LODEMAN.

1. Hand pumps have proved the most satisfactory machine for spraying apple orchards.

2. Power sprayers have proven unsatisfactory because they do not throw enough liquid, and they do not throw the spray far enough.

3. Power sprayers are excellent machines to use in spraying grapes and low growing plants.

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6. The two most important applications made for combatting the apple-scab consist of the one which is made just before the blossoms open and the one made as soon as they fall.

7. If a third treatment is advisable, it should be made about two weeks after the falling of the blossoms.

8. The use of three gallons of Bordeaux mixture upon bearing trees from twenty-five to thirty years of age seems to be advisable; for a part of the beneficial action of this fungicide may be the lessening of insect, especially curculio, injuries.

9. Former applications of the Bordeaux mixture upon the trees of this orchard appear to possess little value in perfecting the crop this year, but all circumstances were not favorable to an accurate experiment regarding this point.

10. The early use of the copper sulphate solution may be of value if orchards are uniformly and thoroughly sprayed with it. In our experimental orchard, with unsprayed trees as probable sources of infection, the value of such treatments has not been very marked.

11. London purple possesses no fungicide properties.

12. Former applications of arsenites appear to have exerted no influence in suppressing insect ravages during the past season.

13. If only one substance is applied to apple orchards, it should, generally, be Paris green.

14. Spraying orchards in some cases increases the yield of fruit from practically nothing to a full crop, but in other cases the operation is followed by nearly negative results in this direction.

15. It is doubtless true that much of the failure of apple orchards to bear is due to the want of proper fertilization and cultivation.

16. The true cause of the formation of rusty apples is obscure, but the character of the season appears to influence the severity of the attack.

17. The Bordeaux mixture has a tendency to reduce rusty fruit.

* * * * * *

18. The ferrocyanide of potassium test used in the manufacture of the Bordeaux mixture is not so satisfactory as was at first thought, for the mixture when so prepared may be injurious to the fruit.

19. Munson has shown that Paris green possesses fungicide properties.

20. Stinson has shown that fruit sprayed three times was larger than that sprayed twice, although the per cent. of scab on both lots was the same.

21. Paris green must be applied immediately after the blossoms fall in order to be most effective against the codlin-moth.

22. Rust was very prevalent in Chautauqua county the past season, but apple growers, on the whole, are well satisfied with the results obtained from spraying.

23. London purple is an unreliable insecticide in some cases.

24. The failures which have occurred may be due largely to the lateness or the hastiness of the application.

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27. The shot-hole fungus attacking plum and cherry foliage can be controlled by the use of the Bordeaux mixture.

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30. Spraying plum foliage with the Bordeaux mixture thickens the leaves, but further measurements must be made to establish a rule.

SAVED FROM FROST.

(A valuable record.)

THE THAYER FRUIT FARM, SPARTA, WISCONSIN.

May 14, 1895, eight degrees below freezing. Frost five successive mornings.

Strawberry fields white with blossoms; currants and gooseberries half grown; raspberries and blackberries bending with buds of fruitful promise.

More than one hundred acres of berries to protect on "The Thayer Fruit Farm." How was it done?

At 11 o'clock a. m. the faithful signal service reports "killing frosts to-night;" at 1 o'clock p. m. a score of men with teams were covering berries with mulch from between the rows and wild hay from stacks near by; the early dawn found them still at work. Result: 90 per cent. of fields so protected, *saved* balance ruined or greatly damaged.

Moral: In localities subject to frost have hay or straw ready for use.

One good load to each half acre.

Wild hay is best, being light and more compact.

One man may protect an acre in a few hours.

Remove covering early next morning to allow continued pollenization.

A thick smudge may protect berries at one or two degrees below freezing.

For lower temperatures cover with suitable protection.

Berry fields and farmers' gardens may be saved in this way.

May 20, 1895. M. A. THAYER, Sparta, Wisconsin.

Experiment Stations, 1894,

ANNUAL REPORTS.

CENTRAL STATION, ST. ANTHONY PARK.

PROF. S. B. GREEN, SUPT.

Mr. President and Members of the Minnesota Horticultural Society.

It gives me great pleasure to report to you at this time. The past season has been, perhaps, the most disastrous one known for the horticultural and agricultural interests of this section, and, yet, we have not suffered more than our co-laborers in what are generally considered a more favorable locations; and that increased interest is taken in horticultural subjects is plainly shown in many ways.

The experiment stations of the State Horticultural Society are generally in good condition and doing valuable work for the cause of horticulture. The central station has established a new experimental farm in Lyon county for general experiment purposes, and horticulture is to have a fair representation in the work there. I know of no section of the state needing experiment work more or offering a more fruitful field for usefulness in this line. A supply of four kinds of Russian willows, the hardiest of the desirable apples, plums and cherries and a considerable variety of deciduous ornamental trees, shrubs and coniferous evergreens have been sent there.

The crops on the land devoted to this division have been fairly good, while some have done unusually well. This may be accounted for by the retentive nature of the soil, heavy manuring and careful cultivation. The history of this work in detail, is as follows:

Publications. Two bulletins have been published by the horticultural division of the central experiment station. Bulletin No. 38, twenty-one pages, is devoted to a discussion of the subject of garden tillage and garden cultivators. Bulletin No. 39, of thirty-one pages, is devoted to a report on forty varieties of potatoes; treatment for potato scab and blight; variety tests of tomatoes and treatment for the prevention of tomato rot; variety tests of strawberries and raspberries; and treatment for apple tree sunscald and cane rust of raspberries.

The two bulletins above referred to can be had by applying to this experiment station, and the results reported there at length will not be found in this report.

Apples. The apple orchards on the university farm have made a very satisfactory growth and have produced a small amount of fruit. There are now 325 varieties of apples on trial in these orchards, many of which have been imported from Russia. The trees are still

quite small, and no considerable amount of fruit can reasonably be expected for a few years. Many of these trees present a very hardy appearance, while the fruit from them is of excellent quality. Some of them have been grown for twenty or more years in this state and have proved themselves to be varieties of great value for this section. Among the kinds on trial, there are some apparently of greater hardiness than the Duchess that are just as desirable and of a different season.

The varieties bearing large fruit, which, so far as tried, are most desirable for planting in this section, are:

Summer and autumn apples.—Duchess of Oldenburg, Breskovka, Borovinka.

Late autumn and winter.—Hibernal, Lieby, Longfield and Anisim.

The division is paying considerable attention to the raising of seedling apples with the hope of securing varieties more desirable than those we now have. For this purpose, it is now growing several thousand seedlings.

Plums. The plum crop of the season just past was unusually abundant and perfect at the university farm; in fact, it never produced more perfect fruit. Our orchard is located on the north slope of a small, gravelly ridge and is protected from the south winds by trees. It has been heavily manured, and the soil is kept cultivated all summer. The result of these conditions and the proper selection of varieties is that since the trees commenced to bear in 1888, only one crop has been missed. Six good crops have been produced in that time. In quality and general appearance, this fruit compared favorably with any fruit exhibited in our markets the past season. The quality of it was very excellent, many varieties being very desirable for dessert purposes.

The varieties that are most desirable are as follows:

Forest Garden, Desota, Weaver, Wolf and Cheney. These are all good, reliable, hardy kinds. Perhaps, if only one kind is to be planted, the Desota should be selected.

Ten varieties of plums have fruited with us the past season. The varieties of plums on trial in this division includes nearly all the varieties of promise sent out within the last few years, as well as the older kinds. Besides the named varieties on trial, we have several hundred seedlings from valuable kinds that are being saved for fruiting. Many of these are from carefully made hand-crosses.

Grapes. Perhaps, there is no crop that is more certain than grapes in favorable locations in this state. At the experiment station, in eight successive years, we have not missed having a good supply of this fruit from our vines. The past season was exceptionally hard on them, and only a fair crop was produced. Success depends very much on the proper varieties and methods of pruning.

The varieties that have given us the most satisfaction are the Worden, Moore's Early, Lady, Agawam, Amina (Rog. 39), Brighton, Barry, Herbert and Green Mountain. The fruit ripened unusually early this year and, on account of the drouth and the leaf-hoppers, was not so good as in 1893. We have now on trial nearly all the important varieties of grapes and several hundred seedlings of our own raising. Experiments to note the effect of different systems of

pruning are in progress. Especial interest centers around the adaptation of the drooping system of pruning vines that are laid down on the ground in winter.

Raspberries. Raspberries were a fair crop only, the yield being considerably lessened by the dry weather in July. On account of the adverse season, the cane rust (anthracnose) and the disease commonly known as "leaf curl" were unusually destructive and in some sections of the state seriously lessened or destroyed the crop. Some varieties are much more subject to these diseases than others, and few, if any, kinds are entirely exempt from them. Cane rust is probably always present in a small way in raspberry plantations, but in average seasons vigorous plants are able to resist the disease and mature a crop of fruit, while in very dry seasons the plants cannot perfect the fruit, the wood for next year and the disease, and, as a consequence, the fruit is the part that is especially liable to suffer. A peculiar trait of this disease is that it does not seem to affect the vigor of growth of the young canes, but injures the crop just when it is ripening. Experiments are in progress at the station in combatting these diseases, and these seem to have been quite successful in preventing the cane rust (anthracnose).

The varieties that are most reliable, are: Red (suckering kinds),—Turner, Marlboro and Cuthbert. Blackcap kinds,—Older, Nemaha, Ohio and Souhegan.

These varieties are on trial besides a large number of seedlings. Of these seedlings, several are now being propagated for further trial and are very promising.

Strawberries. The strawberry crop this year has been generally a poor one on account of the late spring frosts when the plants were in blossom and the severe drouth, which commenced to be injurious when the crop was about one-third grown. At this experiment station, the crop has been fairly good. I attribute our success to the fact that our beds are on retentive soil, well cultivated, and, also, to the fact that the mulch was kept over the plants until as late as practicable. Our beds were not in flower until after the damaging late frosts, and the spaces between the rows and around the plants being heavily mulched were protected from the sun and rapid evaporation.

Our beds that produced their second and third crop were much more productive than the new beds. I account for this from the fact that last season being very dry, the newly set plants did not perfect their fruit beds so well as the older and more vigorous plants of the old beds. But I would not wish to be understood as advocating the retention of old beds, except where they are mowed over and renewed by plowing and manuring according to the well known practice of this station.

Of new varieties, there is little to report, none of them having done better than the best of the older varieties. The most promising kinds for general planting are Warfield, Haverland and Crescent of the pistillate, and Bederwood, Parker Earle and Enhance of the bi-sexual class. The best early berry here is the Warfield, the best late one the Parker Earle. The new kinds worthy of special mention are the Swindle, Edgar Queen and Leader. These fruited in beds

bearing their second crop. Other new kinds in the new bed did not have as good a chance as those in the old bed and should not be condemned on this account.

The strawberry beds at the station were sprayed with Bordeaux mixture in the spring, but they were very healthy, and no particular benefit seemed to follow this application. However, it is my opinion that it will as a rule prove profitable to spray at least once with this material in the spring, though there may be occasional years when there is no apparent benefit.

Currants. Currants produced a fair crop of fruit. In fact, we never have had a total failure of this crop in this state. The borer, which has so often injured the stems during recent years, was less abundant than usual this season. The currant leaf worm was not as troublesome as usual this season. This pest is so easily poisoned with Paris green or white hellebore that there is no good excuse for permitting its presence on the leaves. The varieties most desirable here are the old, well known kinds. Little, if any, progress has been made in the introduction of this fruit, so far as relates to growing it in severe climates. The best varieties are Red Dutch, Victoria, Stewart and White Grape. Many new varieties are on trial, besides over one hundred seedlings of our own raising.

Gooseberries. Gooseberries were a good crop. This fruit is easily raised here. The mildew, which is a serious drawback to its culture in many localities and, especially, to the growing of the better kinds, is easily prevented by spraying the foliage and fruit occasionally with a solution of potassium sulphide at the rate of one ounce to the gallon of water. The material for an acre need cost but a few cents.

The best variety for general cultivation is the Houghton, but by giving winter protection, the Downing, Smith, Triumph and several other kinds may be readily grown. There are many varieties now on trial, besides several hundred seedlings; some of the latter have produced very large fruit, and their behavior will be watched with much interest.

Juneberries. Juneberries gave us a good crop of fruit. The improved kinds are very productive and a great improvement over the wild fruit in this respect. They are desirable, providing the bushes are covered with a netting of some kind at the time the fruit is ripening to keep off the birds, who are very fond of it. We find the variety known as Dwarf Success a great improvement over other kinds tried. We have now on trial five kinds of Juneberries, besides about one hundred seedlings.

Sand Cherries. This native fruit is regarded as being capable of great improvement by hybridization and selection. It varies much in its wild state and under cultivation is very productive. A decided effort is being made by this division to improve it. About three thousand seedlings have been raised, and efforts made to hybridize it with the native plum, to which it is closely allied. Its use as a stock for the plum and cultivated cherry has been attended with favorable results.

Cherries. We are cultivating about twelve kinds of Russian cherries. These are all of the Morello type and are very hardy,

evidently hardy enough for this section. As yet, they have produced little fruit, although they are thrifty growers and make nice trees. It does not seem to me desirable to encourage growing them, until they shall have had a more extended trial.

Potatoes. The experiment work with potatoes has consisted of the trial of forty varieties at the university farm, and a repetition of the tests at Bethel, on some of the best potato land in Anoka county. Experiments have also been made in the use of various materials for preventing the blight and scab on potatoes. The details of this work will be found reported in a special bulletin on the subject. The results of the trial of substances for preventing scab have been very satisfactory and are of special interest. It is plainly shown that slightly scabby potatoes may be planted in new soil without any danger of having the crop from them scabby, providing they are soaked before planting for one-half hour in a solution containing one part of corrosive sublimate to one thousand parts of water.

Onions. Several varieties of onions have been grown from seed planted in the open ground and several kinds from seed sown early in hotbed and transplanted. The crop was considerably lessened by the dry weather of the past summer, yet the bulbs matured well and were hard and well capped, but of small size.

Tomatoes. Seventeen varieties of tomatoes have been grown and a large amount of excellent fruit produced. Experiments have been made in different methods of pruning and training and in the use of Bordeaux mixture to prevent rust.

Nursery and Grounds. The nursery at the university farm is in excellent condition and contains many ornamental and fruit trees and shrubs for planting on the grounds of the university and for supplying the outlying experiment stations. It has suffered little from the drouth of the past summer Considerable nursery stock was planted on the grounds about the drill hall and other school buildings last spring and has added very much to the appearance of the campus. The earlier plantations along the drives and buildings are, generally, developing into fine ornamental specimens that attract much attention.

The labelling of the plants with their common and botanical names and the place from which they were introduced is a measure that meets with universal commendation from students and visitors. It should be the aim of future plantings to add, as much as possible, varieties of interesting kinds on the school grounds. A plant of much beauty from the Rocky Mountains flowered with us for the first time this year. (See Minnesota Horticulturist for August, 1894, page 243.)

The grounds have been improved by the grading and seeding down of the land adjacent to the drill hall. The grass and clover seed sown was made to grow by extended waterings, so that a very good lawn now surrounds the building. A large number of trees and shrubs have also been planted near by, and stone walks have been laid, so that now these grounds are in excellent condition,when it is considered that a little more than a year ago, they were but the remains of an unsightly gravel bank.

Forest Plantation. The forest plantation embraces about five acres. Its object is to furnish a variety of trees such as are of value in this state and to test the value of the newly introduced kinds. The trees are generally grown in rows, eight feet apart. They were planted out in the spring of 1890 and, with few exceptions, have made an excellent growth. There are now forty-three species of timber trees in this plantation. It attracts much attention from visitors and is of great value for instruction to the students of the school of agriculture and, also, as an experiment.

Experiment with Garden Cultivators. A great advance has been made in the introduction of garden implements within a few years, so that by their use many crops may be grown entirely without the ordinary hand labor of weeding. With the object in view of attracting attention to these useful implements and, also, with a desire to study them more particularly, an effort was made last spring to get together a collection of them for trial. Letters were sent to the various concerns manufacturing these implements, and most of them responded by donating them to the school and station. In this manner, fifteen implements were added to our equipment without cost to the experiment station except for freight charges. These have been carefully tried the past season, and a report on them will be found in bulletin No. 38. This is probably the most complete collection of such implements to be found in this country and is of much service in instruction at the school of agriculture.

Fungus Diseases. Several fungus diseases have been experimented upon by the use of various fungicides. The diseases to which special attention has been paid are raspberry cane rust, strawberry leaf blight, melon blight, tomato rot, potato scab, rot and blight and gooseberry mildew. These have been treated in various ways according to the pecularities of the disease. The results are of much interest and will be found reported on in a bulletin shortly to be issued. It may be of interest to say here that it seems very evident that by the intelligent use of fungicides, the potato rot, blight and scab, and the gooseberry mildew, raspberry cane rust and strawberry leaf blight, may be very nearly prevented, and at a cost that makes its probable that within a few years growers will be as well able to combat these diseases as they are now to combat potato bugs. The injury from tomato rot and melon blight did not seem to be lessened by the use of the Bordeaux mixture.

Greenhouses. The greenhouses are in a very good state of preservation and are a valuable aid in the work of the experiment station, in teaching botany and horticulture to the classes in the school of agriculture. The instruction in this study, which in most schools is carried on during the season for active plant life, must here be given during the winter when the material available for this purpose from a natural source is very limited. On this account, a greenhouse is especially needed here. It also furnishes an opportunity for instruction in general greenhouse work; and it is my

hope that, in the very near future, some facilities will be afforded so that instruction may be given in what might be called greenhouse laboratory work. This is a line of study which, I believe, could be made to occupy a very valuable position in our school curriculum.

MINNESOTA CITY STATION.

O. M. LORD, SUPT.

Strawberries. The first ripe strawberry was picked May twenty-eighth; the first full box on the thirtieth. The first shipment was made June sixth; the variety, Crystal City; in appearance, habit of growth and quality of fruit, it is much like Michels Early.

The last strawberries shipped were Captain Jack, June twenty-ninth. The very last berries to be found on the vines were Parker Earle, July sixth. The Jessie has been one of the best till this year, when it apparently suffered with drouth. The VanDeman produced no fruit, though the vines were thrifty and appeared to be in good condition; it is probably not adapted to sandy soil. Crystal City, Bederwood, Warfield, Downer, Capt. Jack, Michels Early, Bubach, Crescent, Princess, Parker Earle and Manchester all bore good crops. The Timbrel was a failure.

Black Raspberries. For home use or near market the Palmer is superior to any other variety tested here. It ripens with the Tyler or Souhegan; it is hardier, has a better habit of growth and bears more and better fruit. It is not as valuable for shipping as the Gregg or the Nemaha. After testing under like conditions for three years with Kansas, Ohio, Davidson's Thornless and Mammoth Cluster, the Palmer is preferred for early and the Nemaha and Gregg for later varieties.

Red Raspberries. Turner, Cuthbert and Shaffer occupy the first places over a large number of other kinds. The Philadelphia, Delaware, Marlboro, Reliance, Henrietta, Brandywine, Ellisdale and others have some merits, but are not as reliable for a series of years as those first named.

Grapes. The yield was rather light, but the quality was excellent. Varieties: Concord, Delaware, Agawam, Moore's Early, Iona, Worden and Lindley.

Of the plants received from the state station, two Japan plum trees and the gooseberry bushes died; the Greenville and No. 7 strawberry plants have made a fair growth.

As a member of the committee on plums and cherries, I would report that of the fifty Russian cherry trees originally set, only twenty remain. Two of them fruited this year; size of fruit medium, quality fair. The Ostheim cherries nearly all turned yellow and fell from the trees when about one-fourth size. What fruit matured was of good size and of fine quality.

Of native plums, the Cheney, Rollingstone and Desota bore full crops. About twenty other varieties bore more or less, but the fruit was not of the average size nor of usual quality. The New Ulm and Ocheeda fruited for the first time here. The New Ulm is a valuable

addition to the list in size, quality and appearance. The Ocheeda is somewhat later and of excellent quality. One of the Japan plums, the Ogon, ripened some fruit July fifteenth; fruit large, yellow and of fine appearance, but in quality for eating does not compare favorably with our best natives.

MONTEVIDEO EXPERIMENT STATION.

L. R. MOYER, SUPT.

The autumnal report already published in the "Minnesota Horticulturist," covers nearly everything there is to report from this station. What is now reported on is something of a repetition of former reports.

Early Planting. The season was a very dry and trying one on all kinds of vegetation.

The beneficial effects of early planting were very apparent. A package of trees from the Iowa Agricultural College was received just as the frost was going out,and they were planted at once. Nearly every tree grew. A package of trees from the central experiment station and a package from a well conducted nursery came late, after the dry, hot weather had set in. Nearly every tree from these late plantings failed.

Conifers. Some complaint has been made that the white spruce trees at Montevideo are failing; but on our grounds where the trees were heavily mulched and cultivated, they are in perfect condition. The trees are too young, however, to enable us to say any more of them than that they promise well. The balsam fir, for example, is equally promising on our grounds, although it is known to be short-lived and of little value even in its native habitat. Our native juniper is at home on our dry bluffs. It is so dark colored in winter as to need something to brighten it up. I know of nothing better for this purpose than the Mugho pine. A cluster of tall, dark junipers, with their irregular outlines, enlivened by a few specimens of this dwarf pine planted in front of it forms a beautiful picture. Dry and trying as are the winters of western Minnesota, the Mugho pine is always green.

Poplars. The publication of Prof. Bailey's bulletin on the cultivated poplars makes it necessary to revise our nomenclature of these trees. Our certinensis poplar becomes populus laurifolia. Our pyramid poplar and laurel-leaved poplar both become forms of populus balsamifera var. intermedia. Our Dudley poplar becomes populus balsamifera, var. virminalis. Our birch-leaved poplar which we have been calling a native species, becomes populus nigra, a many formed European species.

Our Bolles poplar becomes populus alba var. Bolleana. Our unnamed poplar is probably a Russian form of the typical populus balsamifera.

It is an open question as to whether or not the trees will do better under their new names, but it is a great gain to have the nomenclature settled.

Willows. Some competent authority should write a monograph on the nomenclature of our cultivated willows.

Salix laurifolia and salix acutifolia are both doing very poorly with us. The young branches turn black, wither and die.

Acer Ginala. These little Siberian, or Manchurian, maples are very beautiful, hardy shrubs. They prove to be very beautiful in autumn after the frost has touched the leaves.

Prunus Pumila. The sand cherry, too, turns to beautiful reds and browns after the frosts of autumn have touched it. This is only another argument in favor of the ornamental value of this shrub.

Amelanchier. Our native Juneberry is an ornamental shrub of much merit. Its silvery, silky foliage is interesting in any plantation, and its white flowers in early spring open at about the time the shad are running in the rivers. Hence it bears the name, 'shad-bush in some parts of the country. Lovett's Success Juneberry bears fruit about twice as large as the common kind. It is equally ornamental and well worth planting for its fruit.

Elaeaguus. The Russian elaeaguus is proof against drought and cold. It has silvery, silky leaves, making quite a light colored tree. The landscape artist may safely advise its planting wherever a small tree of that character would not be out of place.

Shepherdia. Shepherdia argentea, the buffalo berry, is extremely hardy, and very like the Russian elaeaguus in general appearance. It is suitable for ornamental planting in proper localities. So far as our trees have bloomed, they have proved to be staminate. We have, therefore, had no fruit. The tree is diaecious, and those who would have fruit must be careful to get both staminate and pistillate trees.

Philadelphus. No shrub on our grounds has given us more satisfaction than the Philadelphus. Its beautiful white flowers are admired by every one. It is well to plant all the different species and varieties, for the time of blooming differs somewhat. The Russian variety numbered by Prof. Budd 144 Voronesh is one of the best.

EUREKA STATION.

C. W. SAMPSON, SUPT.

Grapes. The season was very dry, which seemed to have little or no effect on the grape crop. My experimental grapes did fairly well; only two vines bore fruit, the Durant Amber and Cottage. I expect to have a number of vines in bearing next season. Grapes put out their foliage quite early in the season, and I noticed quite a good many buds killed, especially on the Delaware vines. I saw no signs of mildew, and the vines kept in a healthy condition through the season. I shipped my first Moore's Early on August eighteenth and the first Delaware on August twenty-first, and finished shipping September tenth.

LA CRESCENT STATION.

J. S. HARRIS, SUPT.

Experiments with the apple are at the present time occupying a more prominent place in the horticultural work of this station than with any other of the tree fruits. Both in orchard and nursery our apple, pear, plum and cherry trees passed through the winter of 1893-94 without any apparent injury to root, trunk, branch or buds, and the terminals of the yearling root grafts were not discolored. Grape vines, blackberries and raspberries that were not laid down were not seriously injured, and two rows of Cuthberts that stood from seven to nine feet high generally started from the terminal buds. One of the prime causes of this was that the winter evaporation was less than the average.

At the blooming period the outlook for an immense crop of fruit was never better. The final outcome was a little more than half a crop of apples, the largest crop of native plums ever produced in this section, a full crop of raspberries and grapes and a total failure of blackberries. The shortage of the apple crop has been very generally attributed to a frost that occurred late in May, that killed the fruit spurs and caused the fruit to wither, and the hardiest varieties, like the Oldenburg, Tetofsky, Anis, Russian Autumn Streaked and some of the Siberian species, showed this effect the worst. For several reasons, we do not think this was caused by frost. The injury was as great in the center of the tops, where a light frost would not have reached, as on the outside, and less on some trees that we gave a heroic thinning the previous fall. Besides, at that time, our strawberries and grapes were sufficiently forward to have been entirely destroyed by a frost that would have injured the apple, and were not in the least hurt. Our theory is that it was caused by a fungus or bacterial disease that at that time found favorable conditions with the apple to get in its deadly work. We are also of the opinion that spraying with Bordeaux mixture just before that time would have saved much fruit. We get this opinion from the fact that we used the mixture on a few trees—and was obliged to desist on account of an accident, but the few trees sprayed showed less of the trouble and produced more and better fruit than the others. Late in the previous fall fire ran over about half an acre of the orchard, and that portion produced more and better fruit than the remainder, which we attribute to the destruction of insects and germs of disease. Our crop of apples was larger than we expected at the time we reported on small fruits, but the size and quality of the fruit was not up to the average.

Of trees large enough to bear full crops, the Oldenburg, Haas, Wealthy, Wabasha, Peach, Rollin's Prolific and Minnesota, Pride of Minneapolis and Early Strawberry crabs produced the best crops and the Hibernal the poorest. In the experiment orchards, we now have, besides the older and better known varieties, over one hundred and fifty varieties, ranging in age from four to ten years. They are of the but little known Russians and newer seedlings and the Siberian species and their hybrids. In the whole orchard,

about one hundred varieties showed bloomed last spring and about eighty-five perfected some fruit. It is still too early to report upon their merits. The most fruitful tree in the whole orchard is a ten year old variety we have named Young's Greening. It averaged about twelve apples to every foot of limb space in the top. The fruit is small to medium in size, fair quality and promises to be a fair keeper. About one-third of the Russian varieties are making a healthy and medium strong growth, but, so far, the most of them do not show a disposition to bear very much fruit while young The Longfield, Anisim, Good Peasant and Ostrekof are proving exceptions, also, the Transparent family. The Russian Autumn Streaked is the worst blighter, and all the Anis family, except the Blue, are shy bearers and drop their fruit too early. We are much pleased with the Soiree. The tree is a symmetrical grower, and appears to be more hardy than the Wealthy. The fruit is nearly as large as the McMahon, of better quality and a longer keeper, and the tree nearly free from blight.

We cannot say much about blight at this time, as we have had scarcely any of it the last year, except the spur blight, before alluded to, and that in the Autumn Streaked and some of the Siberians. As the Peerless is so prominently before the public, we will mention that our six trees are all doing finely, and nothing on the place looks more promising. One tree bore a single specimen of fruit that was larger and better than any I have seen from the original tree. We have not had a single case of blight in the nursery except on one tree of the Red Queen. About ten more varieties have been added to the nursery list since the last report.

The last season has averaged the dryest one we have experienced for a great number of years, and owing to the drouth and the extreme heat of a few days, has proved disastrous to many newly planted trees and caused considerable loss to root grafts—the most so to the plums; and all trees, both in orchard and nursery, have made less than the average annual growth. The new growth appears to have generally ripened up well, but on a few varieties the buds began to enlarge after the light September rains. The soil is still very dry below a depth of six inches. The experiment of using the sand cherry as a stock for root grafting the native plum promises to be a great success, and the trees upon these stocks withstood the drouth and retained their foliage much better than those upon native plum.

We acknowledge the receipt from the central station of trees of Russian apricot and Japanese plums and plum and sand cherry stocks, most of which we have succeeded in making live. A few of our pear trees showed bloom, but none of them perfected fruit except one tree of Flemish Beauty. There is some blight on this variety, and one of the Russians, a Besemianka, blighted badly. Our best or most profitable plums were the Cheney and Rollingstone; both produced heavy crops and did not appear to be much affected by drouth. The fruit of the Ocheeda, Rockford and Piper's Peach was good, but not much of it. Hawkeye was very poor. The Desotas bore to their fullest capacity, but not more than one-eighth of

the fruit reached the largest size. Judicious thinning would probably have been beneficial to both fruit and trees.

In grapes, besides the older kinds, the Niagara, Brighton, Moore's Diamond and Woodruff's Red are among the very best. The Eaton and Moyer have not so far come up to our expectations.

Experiments on deep and shallow setting of root grafts show that a medium depth, that is, the minimum about 2½ inches below the surface, is better than shallower or deeper, and that mulching is better than such watering as a farmer can give in a dry season.

FERGUS FALLS STATION.

F. H. FIEDLER, SUPT.

I suppose you will be surprised to receive my report from Montana. I have come here for the winter. * * * As to strawberries I made a report last summer.

Raspberries. Cuthbert is the best late market and home berry we have. The Gregg is the largest and most productive blackcap I have, but rather late. The Kansas is not so good a bearer as the Gregg; the first pickings are good, but after the first week the berries become small and crumbly. The Older is a poor bearer here; the berries small to medium. The Caroline bore a very poor crop this year. The Golden Queen, King's Seedling, Taylor, and Colossal did not bear. The season was so dry that there were only a few berries.

Currants bore a good crop. Fay's, Cherry, and White Grape are the best.

Grapes are nearly all dead. Blackberries were a complete failure, and so were gooseberries.

The last two years were very poor seasons for experimenting, on account of drought, but there is no use to get discouraged about it. We must plant on and hope for something better.

I am sorry I cannot make a better report.

EXCELSIOR STATION.

H. M. LYMAN, SUPT.

In making my annual report to the central station I will say there have been few new varieties of apples that have come into bearing this year with us, but at the present writing prospects are good for an abundant crop another year. We have many seedlings that are looking finely which have not fruited yet. Most of the apples raised this year at the station were from seedlings of our own planting, many of them hybrids of the Wealthy, Duchess and crab varieties.

As regards the Russian varieties of apples which we have planted out, a report may be misleading, for the varieties are somewhat mixed up, as we all know. Among the trees planted three years ago, one Russian was marked Romenskoe (599). As the tree

developed we thought now we had a tree that would stand the climate of Minnesota, of Russian origin, besides the Hibernal and Duchess, but now we find it to all appearance to be the Hibernal. We have other varieties that look very promising, viz: Repta Kretshoe, Charlamof, Boravinka, Anisim, Red Repka (200), Aromatinoe (354) and Good Peasant.

Of other varieties that look promising, I will mention Patton's Greening and Peerless. These all look as well as trees can in any climate, though a very severe winter may change their appearance somewhat.

Though the past has been an extremely dry season, our young trees have made a good growth. Some varieties have suffered somewhat from blight, Lake Winter crab the worst.

OWATONNA STATION.

E. H. S. DARTT, SUPT.

In experimenting with fruit trees with a view of developing hardiness, it is impossible to make rapid progress without the frequent recurrence of very severe winters. It has been ten years now since we had a test winter. As a consequence, nearly all apple trees not predisposed to blight and some that are, are doing well, confidence is being restored, new varieties are being boomed, many of which will eventually be of little value. There seems to be a rising tide and though there is an undertow of past experiences that tends to sadness, yet the swell moves on and will continue to move on till it strikes another iceberg, when it will recede. It is to fortify against and stop, if possible, this receding wave that we labor.

As a result of this succession of mild winters, our apple list has increased until, including the synonyms and accessions of the present winter, it now contains 800 varieties of grafted trees, besides a large number of ungrafted seedlings from our best Minnesota apples and crabs. The best of these will be grafted as fast as they develop desirable qualities. Nearly every noted grower in Wisconsin and Minnesota and some in Iowa are here represented by some of their hardiest stock. Some varieties have come from unknown sources. Magog, Memphremagog and Hamangog are evidently from Vermont.

About 230 of these varieties have been placed in the orchard, which now contains 800 trees, and the condition of each tree as to vigor and blight is marked up each fall. And later on, as trees come into bearing, productiveness, size and quality of fruit will be noted. The plan has been adopted of thinning out the trees on all nursery ground, leaving as many as can stand without crowding, giving preference to one or more trees of each variety. In this way a large number can be tried without the trouble of transplanting. As many of these trees are approaching bearing size, marking in future will likely extend to this class. After our next hard winter, the study of this list must become very interesting and profitable to the planter, as it will show the behavior of different varieties for a series of years.

Blight has been more general than ever before, but has been mostly confined to small branches, so that the damage has not been very serious. Until some effectual remedy for blight shall have been discovered, it will be best not to plant blighting kinds, for if such varieties are well cultivated and well manured, they are likely to be ruined by blight, and without this treatment the orchard will soon be ruined by starvation. The drouth was very severe. Root grafts, of which about 4,000 were planted, did poorly, and a large proportion of newly planted trees failed to grow. About 2,000 small evergreens were planted, two-thirds of which were saved by irrigation. 6,000 root grafts, of more than 200 varieties, are being made for next spring's planting.

While I have the condition of every orchard tree marked on my record, I have concluded to abridge here and only mark each variety in such a way as to show its average condition. HARDINESS or vigor is shown by figures: 1 extra being best, 1 good, 2 poor, 3 very poor and 0 dead. BLIGHT is shown by B with minus and plus signs: B— very little blight, B considerable blight, B+ much blight, BX ruined by blight. A few varieties were neglected two years ago and will likely improve in the future. I wish to call attention to the Longworth pear, which has been doing remarkably well for the last three years.

PEARS.

Rus No. 34	B+
" " 352	2
" " 391	1
Longworth	1 Ex

CHERRIES.

Budd's Autograph	1
Tutovka	1 Ex
Linder	2
Early Richmond	1
Utah Hybrid	1
Orel No. 24	3
" " 23	3

PLUMS.

Hawkeye	1
Cheney	1
Wyant	1
Rollingstone	1
Weaver	1
Hillman	1½
Speer	1
Wolf	1½
Garden	2
Rockford	1
Owatonna, (not true)	
Miner	1
White Nicholas	2
Black Prune	2
Patton's Native	2
Early Red	1½
Gates	1
Black Hawk	1
Ocheeda	1
Desota	1
Pottawatomie	1

APPLES.

Gideon's Jan.	1
" Oct.	1
Gideon	2
Gibb crab	1½
Kourk's Anis	B+
25 T	1 B
Hibernal	1 Ex
Unknown	B+
"	1 B
Duchawoe	1 B—
7 M	2 B
Patton's Russet	1 Ex
Whitney No. 20	1
Unknown	1
Greenwood	1
Tetofsky	1
Rus 190	2 B—
Hislop crab	0—BX
Seed J	1 B—
Rus 243	1 B—
D H No. 3	1 B—
D H Graft Oct.	1
149 M	2 B—
Early Strawberry	1
Unknown	1 B—
18 M Anisim	1 Ex
Unknown	1 B—
Kimball	0
Dartt's Porch	0 BX
Milton crab	1
D H top graft	
Miller's Seedling	1
Seed D	2
Seed L	1
Reponka	2B
Minn. crab	1
Unknown Rus.	2 B+
Red Anis	1
Rus. unknown	3
Avista (Phillips)	1
Phillips No. 2	1 Extra
Bevel Glass	1
Shining Aromatic	1 Ex
Rosa Aport	1 B—
Stepanof 213	1
Heidorn 164	2 B—
Borsdorf 356	2 B+
Moscow	1 B
Arabian	1 Ex
Vineuse	1
D H Seed	1 Ex
Phoenix No. 57	1 Ex
" Duch 49	1
" Fall Orange Sd.	2B
Phoenix No. 32	3
" No. 90	1 Ex
" No. 56	2
" No. 50	1
" No. 62	2
" crab	1 Ex
" No. 77	1 Ex
Maguet (Peffer)	1 B
Seed R	1
Seed P	2
D H Nog	1
Arthur (Patton)	1 Ex
Rus 413, true	1
Excelsior	1
Isham crab	1 Ex
Gideon's Sept.	1
" Peter	2
Sarnia crab	2
Unknown	2
Silken	1
Hotchkiss	1 B
Duchess	1 Ex
D H No. 1	2
Unknown	1 Ex
Red Bark crab	1 Ex
Duch No. 8 (Pat.)	1 Ex
Iowa Beauty	2
Rus 120 M	0
" 3 M	2
Wealthy	1¼
Gideon's Lou	1½
Mills' Seedling	1½
Shields' crab	1 Ex
Palmer's Sweet	1
Mitchell's Seedling	2
Borovinka	1
Haas	2
Baldwin Seed	1
F Pet (Phoenix)	1
Esteline (Brand)	1
D H No. 19	1 Ex
Champaign Pip	1 Ex
6 Vor	1 Ex
21 T	3
Good Peasant	1
Rus 224	1 Ex
" 103	1 Ex
Browery	1
Transparent	1 Ex

Smoky Arcad	1 B—	Thompson No. 29	1 B—	Dartt's Porch	2 BX
Little Hat	1 B—	D H No. 5	1	Phoenix Duch. Sd.	1 Ex
Gaines' Swedisher	1 Ex	Quaker Beauty	2 B—	Florence	1 Ex
Seed M	1 Ex	Phoenix crab 24	1 B+	Hart Seed (Silas)	1 B—
" G	1 Ex	Martha crab	1 B	Va. crab	1 Ex
" F. BX replaced		Tubb's Iron Clad	1 B—	Richland Winter	1 B
" C	1 Ex	Patton's Greening	1	Seed I	2 B
" S	1 Ex	D H No. 26	1 B—	" H	2
" D	1 B	Gideon's No. 6	1	Winter crab	1 Ex
" T	2 B	Blushing Maid	1 Ex	Wild crab (Fluke)	1 Ex
" A	1 B—	Seed A M	1	Leudloff	1
Grosco Skalanka	1	Okabena	1 Ex	Wolf River	1½
21 Vor	1	Thompson No. 88	1	Seed B	1 B—
Rinouski	1	Rus 148 M	1	McMahon	1½ B—
Yellow Sweet	1	" 593	1	D H No. 24	1
Herron 87h	1	" Nix	1 Ex	" " 22	1
Hare Lipka	2 B—	Romna 599	1	" " 11	1
Aromatic 977	0	Shephard 475	1	" " 27	1
Anisette 185	1 Ex	Grand Duke	2	" " 25	1 B
Rus 222	1	Sweet Streaked	2 B	" " 17	1
Reinette Red	1 B—	41 Vor	1	No name (Pat)	1
Stupka	3 B—	Red Streaked	3 B	Hislop Sd. Wint.	3 B+
Lubs Reinette-or		Green Glass 187	1 B	Lowland	1 Ex
— " Queen	1	Rus 149	1 B	Prof Goff	1
White Skrute		" 544	1 Ex	N. W. Greening	
— Round White	1	Pear 267	1 B—	(Plumb)	1 Ex
Saxonia	2 B+	Green Butskara	2	Yearly's Winter	1
Antonovka	1	German Collville	1 B—	Peffer No. 11	2
Aport Orient	1 B—	81 T	1 B—	Acker's Duchess	1
Moscow	1 B—	Ostronskoe	1 Ex	D H No. 10	1 Ex
Red Titka	2 B	Rus 223	1 B—	Plumb's Russet	1 B
Rus No. 450	2 B—	" 216	1	D H No. 7	1 B—
" " 87	1	D H No. 22	2 B+	Barr's Yel. Sib.	1
Thompson No. 37	1	Duchess Seed	1 Ex	Gideon's Aug.	2
" No. 24	1	D H No. 3	1 B—	Phoenix No. 12	1

DISCUSSION.

Mrs. Stager: I want to ask something right here about the experiment stations. I believe they are to decide at the experiment stations what fruits are best adapted to those localities where the stations are located. I believe there is an experiment station at St. Cloud. We have never had any reports from that place, or known whether anything has been done to help it or not.

Sec. Latham: Mr. Meyers was the gentleman in charge of the reformatory at the time the experiment station was established. I had a letter from him lately, speaking of his removal. He has been superseded by another gentleman, and since that nothing is being done there,, I think it would be best to drop it from the list of stations.

Mrs. Stager: People around there would like to have some place to go to see how things ought to be done. When the trees and fruits were shipped to St. Cloud, they lay there until the convicts came out and planted them, and most of the small fruits were put inside the reformatory grounds where nobody could ever see them; and while our people were anxious to learn all they could about the matter, yet the experiments carried on there were of no help to them. There are several parties there, if they had a chance, who would be willing to take fruit and take care of it for the good of the people outside.

Pres. Underwood: I suggest that Mrs. Stager call this matter up at some time when Prof. Green is present.

Mr. Harris: Speaking about experiment stations, we have none too many, and I supposed they had one at St. Cloud that was a great benefit to the people there, and I am sorry to learn they have none.

Mr. Dartt: I will say that I have not been able up to the present time to send any report to Prof. Green, and I have no report written out, but the law requires that I should report in person to your society, and I am here, and if there is anything in regard to the station you want to know you can put me through a course of sprouts, if you not ask me to abuse my neighbors or tell too big a lie. I will answer any reasonable question.

Mrs. Kennedy: I will ask Mr. Dartt if he has any trees to sell?

Mr. Dartt: Yes.

Mrs. Kennedy: I propose we all buy some of them, because we take it for granted they are good.

Mr. Dartt: I have finally concluded to sell trees on my own account. There are trees of hundreds of different varieties, and I have concluded to sell them. I shall not sell them extra cheap, but just a fair price, and what money comes in will go into the state treasury, so there is not much of an object for me to boom anything, or try to sell anything that is no good, and I am not mean enough to run down anything that is good to keep anybody else from selling—I do not feel as though I were. I am there to find out what fruits are good, and to tell all their qualities, good or bad, and that is what I intend to do just as fast as the information comes. I have a good many varieties there; but as yet none of them have borne, and I am not prepared to say much about them. We have not had a real hard winter since I commenced, and I cannot swear as to the hardiness of anything I have got. Some of the Russians appear to be more hardy than the Duchess or the Hibernal. I may say that in an orchard of 800 trees, probably, composed of three hundred varieties, I go through each fall—and I also did this last fall—and mark every tree so far as the quality is concerned. There is one thing I have got that I am encouraged in. I have three Longworth pear trees. I have had them three years. They have made a growth of some three to three and a half feet, and they appear to be just as hardy as any apple tree I have in the orchard.

Mr. Brackett: When will they fruit?

Mr. Dartt: There is some prospect of fruit this year. I have never seen any pear trees bearing. If there is any other question, anything I know, I will answer.

NEW ULM STATION.

C. W. H. HEIDEMAN, SUPT.

CLASSIFICATION OF THE SEXUAL AFFINITIES OF PRUNUS AMERICANA VAR.*

THE PROBLEM.

The uncertainty of the regular annual fruiting of plums in the Northwest, where only the native *Prunus Americana* in its many varieties has been found sufficiently hardy to endure the climatic conditions, has long been a difficult problem in horticulture.

Writers on the subject of plum culture have attributed as the cause of the more or less non-productivenes "the influences of domestication and consequent high culture," "self-sterility," etc., etc. The beneficial effect of cross-fertilization has been hinted at and proposed as the remedy for all cases of infecundity. Mixed and close planting of the varieties to better ensure cross-fertilization has been suggested by nearly all of them. Reports of various horticultural societies are filled with instances of the beneficial effects of cross-fertilization, but, reading between the lines, as many or more instances of the failure of good results fron cross-fertilization have been recorded. Cross-fertilization, therefore, unless it be effected in the direction of the natural affinities of the varieties, does not completely explain why certain varieties, even with the aid of cross-pollenation, may be prolific one season and the next produce no fruit at all; why one season the fruit will be large and fine, the next inferior in size and quality; why an unusually fine variety in the woods and thickets will be worthless when removed from its surroundings, even with subsequent best of care and culture.

About ten years ago I began making artificial crosses for the purpose of breeding improved varieties. My grounds contained at least two hundred trees, mostly selected from the woods and thickets along the Minnesota and Cottonwood river bottoms, together with a few horticultural varieties of *P. Americana*. I soon found that many of my desired crosses were difficult to obtain. I observed numerous adaptations to ensure cross-pollenation, together with differences in morphology of the stamen and pistil. Crosses between certain forms were fully fertile, while with others negative results were invariably obtained. Reciprocal crosses between varieties and between species were not equally fertile. I determined to go into the matter systematically, keeping a careful record of each cross made and noting the result, raising hundreds of seedlings and again experimenting with them.

*A paper read before the Minnesota Academy of Natural Sciences, Jan., 1895.

Prunus Americana and other species of the prunus vary much in their wild state in flower, fruit, foliage, season of maturity and other botanical characteristics, so much so that an enterprising botanist might easily pick up in the thickets of almost any natural area where they abound a dozen or more varieties with characters so distinct from the type as to entitle them to the distinction of specific varieties.

The writer has no desire to inflict upon scientific botany any further division of the botanical characters of a species which is already sufficiently defined, but only offers his classification for the purposes of this paper in the interest of economic horticulture.

CLASSIFICATION.

Adopting the nomenclature used by Darwin in his "Different Forms of Flowers on Plants of the Same Species" and classifying as to morphology and function, we find the following fairly well defined forms in addition to the hermaphrodite form of botanists.

DICHOGAMOUS GROUP.

Proterogynous, (plate 1, fig. 1) on which the stigma is ready for fertilization and has passed the receptive stage before the pollen matures.

Proterandrous, (plate 1, fig 2) on which the pollen ripens and matures before the stigma is ready for fertilization.

HETEROSTYLED GROUP.

Long-Styled, (plate 1, fig. 3) on which the pistil is nearly twice the length of the stamens.

Short-Styled, (plate 1, fig. 4) on which the stamens are nearly twice the length of the pistil.

BISEXUAL GROUP.

Gynodiœcious, (plate 1, fig. 5) on which the flowers in morphology consist of perfect flowers, but mostly females with anthers aborted and only a few grains of pollen, and these smaller and mostly aborted.

Andromonœcious, (plate 1, fig. 6) on which the flowers in morphology consisit of perfect flowers, but mostly males with most of the pistils wanting or only present in a rudimentary form.

These divisions in morphology and function are generally well defined, but sometimes graduate into each other. The hermaphrodite form, which is the only one capable of self-fertilization, is now scarcely found in a wild state. Most of our cultivated varieties of *P. Americana* are transition forms of this and are somewhat difficult to classify. Some of the horticultural varieties certainly belong to the next, and a few are certainly heterostyled. Dichogamous varieties are more frequently met with in nature.

The *proterogynous* form is easily distinguished by most of the pistils projecting through and above the petals, which for a day or two remain incurved over the still immature stamens, thus mechanically preventing the ripening of the pollen, and fertilization, if accomplished at all, has generally been effected before the petals expand. I

Fig. 1

Fig. 2

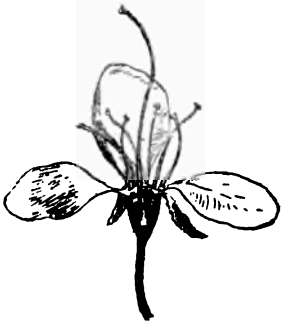


Fig. 3

Fig. 4

Fig. 5

Fig. 6.

PLATE 1. Flowers of *Prunus Americana* slightly enlarged.

have also noticed in intense forms of this and the next a considerable difference in the time in which the stigma became receptive and the pollen mature after exposure to air and sunshine.

The *proterandrous* form is also easily distinguished from the fact that the pistil, before the petals expand, is found curved within the corolla, the stigma being inverted and partly within the calyx tube. About twenty-four to thirty-six hours after the petals expand and, usually, after the pollen on the anthers has all dehisced, the pistil gradually assumes an upright position and becomes receptive, and as the stigma does not become receptive until after an exposure to the influence of light and air for at least an hour or two, self-fertilization is prevented. The peculiarities of the two dichogamous forms not only in a measure mechanically prevent self-fertilization but certainly prevent the maturation of the pollen grains and stigmatic secretion at the same time, and this alone in the more intense forms is sufficient to prevent self-fertilization. With respect to heterostyled plants Darwin* says: "Unless it be proved that one form is fully fertile only when it is fertilized with pollen from another form, we have not complete evidence that the species is heterostyled. But when pistils and stamens differ in length in two or three set of individuals, and this is accompanied by a difference in the size of the pollen grains or in the state of the stigma, we may infer with much safety that the species is heterostyled." If the above test is correct, then a few individuals of our species are heterostyled, and many more are tending in that direction. Bisexuality is clearly defined in many individuals in nature, the male form being more numerous. I have frequently met forms entirely devoid of pistils. Now and then, I have found forms which do not appear to come under any division of the foregoing classification. For instance, I have a tree which for three years has produced flowers, each of which had two and, in a few instances, three apparently perfectly developed pistils. So far no fruit has set, although I made last spring a number of hand crosses to determine its affinity. These freak forms are the exception, and with them this paper has nothing to do.

POLLINATION AND FERTILIZATION.

The fruit buds of *P. Americana* are developed on the spurs and spur-like branches of the current season's growth. The following spring, on approach of steady warm weather in May, the buds swell and expose from one to five flowers in a simple umbel-like cluster. The period of bloom and the time when pollination may be effected generally extends over two or three days, and in cool and cloudy weather it may extend over a week. Pollination is effected by the aid of wind or insects. Within from two to twenty-four hours after the blossom has fully expanded, or in the dichogamous forms after the pistil and stigma have been exposed to light and warmth, the stigma becomes receptive, as may be plainly seen with a glass of moderate diameters by the glistening secretion on the stigma. Pollen ripens during clear, warm weather in about the same time, varying slightly in the different varieties. Within three or four

* "Different Forms of Flowers on Plants of the Same Species."

days after fertilization has been effected, the petals drop off and the calyx tube is parted over the now slowly swelling ovary and drops off. When pollination has not been effected, the blossom continues fresh for several days, although the stigma may have become covered with dust and withered and become non-receptive, and it finally drops off, the peduncle remaining for a day or so longer. The peduncle lengthens to nearly its full length from the time the blossom bursts from the bud until fertilization is complete and, when legitimately fertilized, enlarges in diameter. When fertilization has been illegitimately effected the peduncle does not enlarge in diameter as much, and the slightly enlarged ovary usually falls, together with the peduncle, within from three to twenty days after fertilization. The season of full bloom ranges in different varieties over a period of about ten days. The past season, 1894, my earliest blooming varieties were in full bloom May 2d and the latest May 10th.

The actual time in the life of a blossom during which fertilization may be effected scarcely exceeds two hours and is not, as many suppose, during the whole life of the expanded flower.

LEGITIMATE AND ILLEGITIMATE FERTILIZATION.

From the many artificial crosses that I have made and recorded, I long ago became convinced that fertilization might be effected in different degrees and that many plants had the power of throwing off such ovaries as were fertilized by pollen lacking in sexual affinity and that this was especially true in *P. Americana*. It should be borne in mind that the production of seed is the chief end of the act of fertilization and the vivification of the ovule is the primary object of pollination. By systematic crossing and hybridizing, I determined that the union of the reproductive elements of two trees possessing the proper selective affinity for each other readily produced a stronger developement of the ovary; a union of this kind I shall call legitimate.

It is well known that by crossing distinct species fertilization is effected with more or less difficulty; that reciprocal crosses of the same two species vary in the intensity of fertilization. As to the union of the reproductive elements of varieties lacking in sexual affinity for each other or in which the reproductive elements have become too greatly differentiated and the development of the ovary either fails entirely or is below the normal, I shall use the term illegitimate, and in the same sense as used by Darwin in his "Different Forms of Flowers on Plants of the Same Species." The simplest test to determine the sexual affinity of any variety, and one which I have never known to fail when done under proper conditions, is to take several sets of flower clusters and pollinate each individual stigma with pollen of a different form. The union of such crosses as possess the proper degree of affinity will prove fertile, while the union of those lacking in affinity will prove sterile. No matter how many of the flowers of each cluster are pollinated legitimately or illegitimately, the result will be as above. If all of the flowers of a cluster are pollinated legitimately, they will all set fruit, barring accident, of course. This experiment may be modified by many different combinations.

RESULT OF SELF AND CROSS-FERTILIZATION.

In the diagramatic chart following (plate 2), I have attempted to give in the simplest and most condensed manner the results of severla thousand artificial hand pollinations made by me during a period of five successive years, together with some earlier data and observations, all made in a very careful manner and carefully recorded, the details of which would be too long and burdensome for this paper. Most of my data for pollinations made with pollen of the *andromonœcious* form on the long-styled heterostyled form were accidentally lost, and at the time of compilation consisted of but three records. I am unwilling at this time to state positively that pollination in the above direction would produce legitimate fertilization; I have, however, on the basis of incomplete data and from theoretical conclusions, indicated the probable rule by a dotted line. The central column represents the form of pollen used; the lines between the different forms indicate the directions in which fertilization is positive or negative, or, in probably more expressive terms, legitimate or illegitimate. Of the forty-nine possible combinations, or directions, of pollinations but one form, the hermaphrodite, is fully fertile with its own pollen. Including the hermaphrodite form, cross-fertilization is legitimate in only thirteen directions Thus it will be seen that among the seven forms of *P. Americana* pollination is possible in forty-nine directions, thirty-six of them giving negative or illegitimate results, and that there are only thirteen directions in which cross-fertilization is possible.

I know of no group of plants more favorable than the genus Prunus for the study of the order of evolution from the hermaphrodite stage to the higher stage of bisexuality. Their organs of reproduction, as I have shown, present a number of peculiarities of morphology and function, unusually interesting and significant and at the same time unusually intelligible, nor are these peculiarities exhibited to the same degree by any other group of plants. A study of these numerous adaptations to insure cross-fertilization must necessarily end in the conclusion that our species is gradually approaching a state of diœciousness, and, fortunately for our discussion, there appears to be no missing link in the chain.

With these numerous adaptations and structures to prevent self-fertilization and to insure cross-fertilization in view, we are prepared to understand why, in the several cases, self and cross-fertilization is possible, and why impossible; why cross-fertilization is possible in a certain direction, while the reciprocal cross may be sterile, and, finally, by what means our species is gradually becoming diœcious. The wedge of variation, having gained a hold of our hermaphrodite form, still in existence and capable of self-fertilization and forced by long continued self and occasional cross-fertilization, produced the earliest types of our dichogamous group which the better insured cross fertilization. In the proterogynous form, the pistil, protruding through the still undeveloped petals and stamens and receiving the advantage of sunlight, air and warmth, was encouraged to greater development, the stamens being correspond-

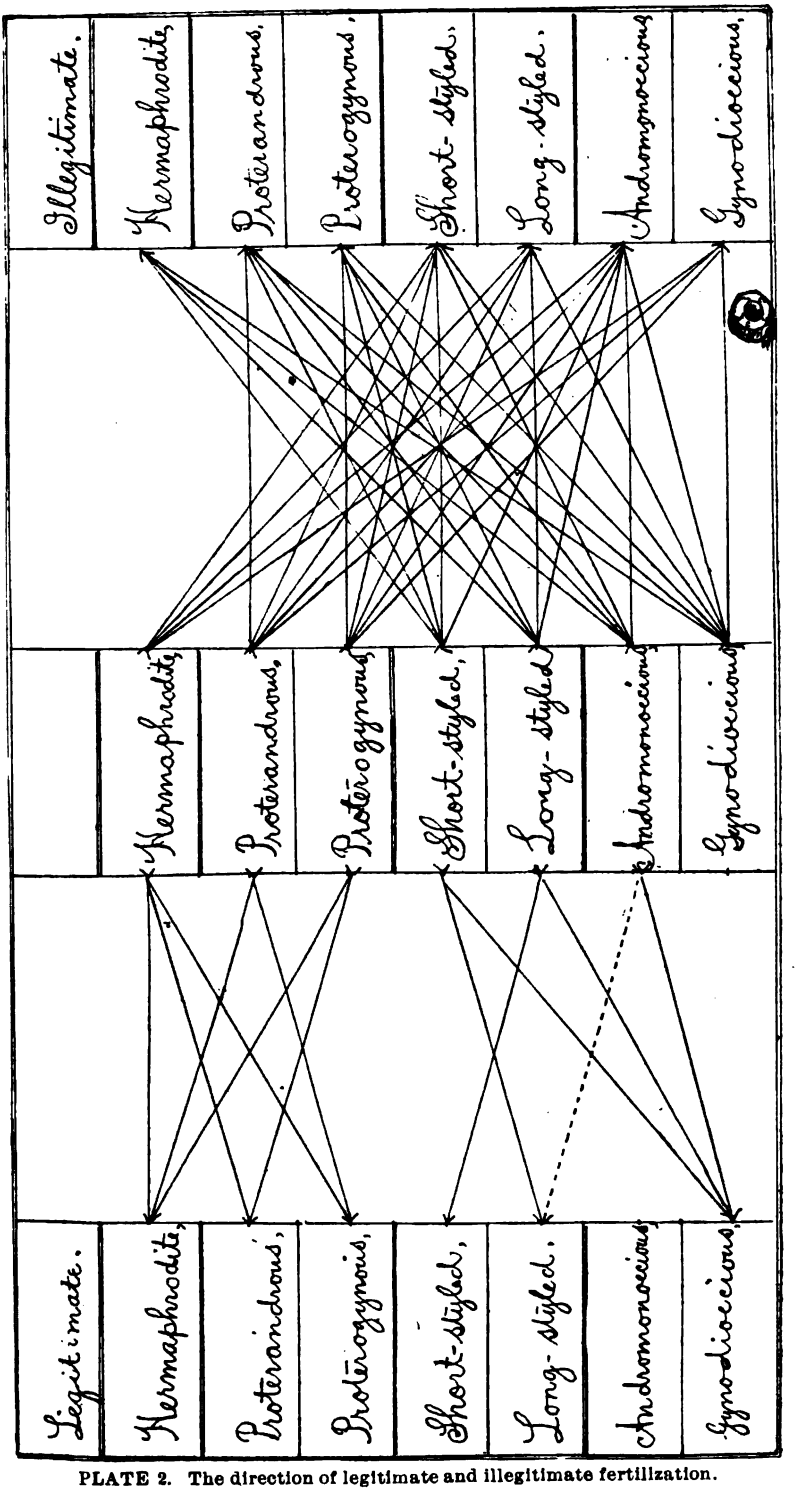


PLATE 2. The direction of legitimate and illegitimate fertilization.

ingly retarded. In the proterandrous form, the stamens received the benefit and the pistil was retarded. Through successive generations, the influence of the law of balancement has been at work, the evolution towards a separation of the sexual organs has fairly started, and we have the foundation in the proterandrous and proterogynous forms for the pistillate and staminate forms of a future diœcious species. Simultaneously with the development of the pistil and retardation of the stamens and vice versa, came the further adaptation of difference in time of maturity of the reproductive elements, with an additional protection against self-fertilization.

The development of the reproductive organs, aided by the law of balancement, continued, and we have developed the heterostyled group. What was before accomplished to quite an extent by purely mechanical adaptations, is now accomplished by a differentiation in the reproductive elements. So great a differentiation in the reproductive organs surely caused a differentiation in the sexual elements.

Our species has now become divided against itself. The differentiation of the reproductive elements was followed by still further development and retardation of the reproductive organs—and we have nearly reached the bisexual stage, not only in morphology but in function. We now have only a step further to the complete separation of the sexual organs.

In the earlier stages of the dichogamous group, self-fertilization was possible but mainly prevented by mechanical adaptations to insure cross-fertilization. In the heterostyled group self-fertilization is prevented by the great differentiation in the reproductive elements, and the sexual affinity destroyed. There can be no doubt that the differentiation into species was accomplished by variation of form, foliage, cell structure, etc., without a corresponding differentiation of the sexual elements. We know this from the fact that distinct species will sometimes cross, but not freely, in a reciprocal direction. I have myself, within the past ten years, produced hybrids between *P. angustifolia* and *P. Americana;* between *P. domestica* and *P. Americana;* between *P. Besseyi,* Bailey (*P. pumila,* Lin.) and *P. hortulana,* B.; between *Cerasus avium var.* and *P. Besseyi,* B. I made several hundred crosses to produce hybrids between our sand cherry (*P. Besseyi*) and horticultural varieties of *Cerasus avium.* Pollen of *C. avium var.* on P. *Besseyi* invariably proved sterile; reciprocal crosses set fruit, but they failed to germinate, the seed containing only a trace of the aborted ovule. When I finally used the pollen of a proterandrous form of *P. Bess* on a short-styled form of *C. avium* fertilization was effected and developed a normal fruit, the seed of which germinated and produced an undoubted hybrid. The reciprocal crosses of the same varieties failed to fertilize a single ovule out of over fifty crosses made. I had applied the same principle in the production of hybrids between *P. hortulana* and *P. Besseyi* with fair success. The successful crosses just mentioned were made with pollen which had not been too greatly differentiated, on a pistil which, in accordance with the theory advanced for the evolution of the different forms,

had been retarded. The unsuccessful crosses were made with differentiated pollen on a pistil not sufficiently differentiated. Finally, we must conclude that the means by which the bisexual forms have been produced, though gradually and necessarily very slow, are identical with the forces that produced the different species. In the crossing of the different species, we find that by applying the same rule for cross-fertilization we can trace the genealogy back to the forms wherein the differentiation of the sexual elements had not destroyed their affinity. From these experiments we deduce the following:

CONCLUSIONS.

Self-sterility of *Prunus Americana* in the heterostyled and bisexual forms is caused by the great differentiations of the sexual elements.

Pollination by wind and insects cannot be controlled to any extent. Mixed planting, therefore, unless it be done with respect to the natural affinities of the varieties, may produce the most disastrous result for the horticulturist.

Other species of Prunus observed show these characteristics of *P. Americana*, and it may be possible to bring them together and under a similar classification.

Finally we have gained some knowledge in the summary production of hybrids.

This study is necessarily preliminary to further investigation touching horticultural varieties of *P. Americana*, etc.

EVERGREEN TREES.

E. H. S. DARTT, OWATONNA.

In this world of ours we value things according to their abundance or scarcity. If gold was as plenty as iron, its value would go till the term sixteen to one would become obsolete. So of the beautiful evergreen tree. In regions where nature has provided for all its requirements, it is so very common; but when we approach the borders of what used to be known as the great American desert, we look upon it as a thing of beauty, and we are anxious to study out some plan by which we can make it a joy forever.

Excessive drouth is a great impediment in the way of the successful growth of trees. How shall we counteract its influence? I would say, first, by preparing a very deep, rich, mellow soil—for a rich soil will generate and retain moisture much better than a poor soil; next, by thorough cultivation, stirring the soil frequently to the depth of three inches during periods of drouth; next, by irrigation, which must be continuous and thorough, for a little water like a little learning is thought to be a dangerous thing, for it quickly evaporates and leaves the ground in worse condition than before it was applied. In watering a tree, it is thought best to make a slight depression about it and give a three foot tree three or four pailfuls, increasing the amount according to the size of the tree. Then, replace the soil or mulch and let it rest for ten days or two weeks,

when, if drouth continues, water again. The first watering should not be delayed too long, for, if a tree begins to wither, watering is not likely to save it.

Another way of guarding against drouth is to protect trees from the force of hot winds and the direct rays of the summer's sun. This may be partially done by driving stakes and stretching canvas two or three feet from the tree on the south and west. The best protection is an open windbreak on the south and west from thirty to fifty feet from the tree needing protection.

If we can plant on a north slope or hillside, the hot winds will have less force, and the sun's rays will strike so obliquely as to do little harm.

In drouthy sections, we find it advantageous to plant such varieties as are known to be good foragers and make rapid growth. Where it is difficult to make trees grow at all, we can scarcely tolerate slow growing or short lived trees; but there are places where this class of trees can be used to good advantage. Many lawns and parks are ruined by too many trees planted for immediate effect and want of courage later on to remove enough of them so as to give those remaining ample room. It were better in lawn planting to have an eye to the future and plant a few trees for permanent growth and then fill in for immediate effect with dwarfs and such short lived trees as balsam fir and white birch, which are likely to look well for a few years and die out as soon as the space would be needed by other trees. No tree or man can take on majestic beauty without room to expand. What would Lincoln have been but for the rebellion?

As an ornamental tree for favorable localities in southern Minnesota, I place the Norway spruce at the head of the list. It is quite sensitive to extreme cold and is sometimes killed when small or has its branches killed at the snow line, making it difficult to get trees to limb down to the ground except in highly favored localities. When we get it up a little from the ground, it makes a rapid growing, robust tree and stands drouth well. Trees thirty years old, about Owatonna, seem in perfect health. White spruce comes next. It can stand more cold than the Norway, is less likely to turn brown in spring, and I don't know as it has ever been winter-killed here; and, until the lessons of the past season of severe drouth, we gave it first place. Side by side with the Norway, and subjected to exactly the same conditions and treatment, fully twenty per cent. of the white spruce died, while of the same number of the Norway spruce (about three hundred) not a tree was harmed.

From this we may conclude that varieties are not likely to withstand great extremes of both heat and cold and that the natural place for white spruce to grow most successfully will be a little to the north of that of the Norway spruce. If we are near the southern limit of the former and near the northern limit of the latter it will be hard to determine to a certainty as to which is best for our immediate locality.

The Colorado blue spruce is the most beautiful evergreen or ever-blue tree that I have ever seen. In hardiness, it seems about

equal to the white spruce. Of a lot of seedlings, not over twenty per cent. are likely to be blue enough to be decidedly ornamental. Consequently, the bluest trees command a very high price. It seems a little queer that the development of blue in trees greatly enhances their value, whilst in men the opposite is true. The bluest men are of least value; still, some may prefer a man who is very blue to one who is ever-green.

The Douglas spruce has sometimes had its new growth injured by late spring frosts. It is of quite rapid growth, and,in hardiness we are inclined to class it with the Norway, but of its real value we know little.

The Scotch pine is the most reliable among our well known evergreen trees. It is of very rapid growth while young, stands drouth well and is very desirable for windbreaks and for timber. Its wood is coarse-grained, hard and brittle, admitting of smooth turning and fine polish. Finished in oil it equals in beauty the celebrated Georgia pine. Like men and women, its beauty fades with age, and as a lawn tree it is a nuisance, as cones of the right size to clog a lawn mower keep dropping the season through. Young trees are sold cheaply and are easily grown.

The white pine, our great timber tree, is a little more ornamental than the Scotch pine but is less likely to thrive in exposed situations, but with a little protection it is very desirable.

The Austrian pine is not quite hardy but is likely to stand as well as white pine, and its very dark green foliage makes it very desirable by way of contrast.

The red pine is very promising,and with its long spines and rank growth is quite a novelty, and is likely to rank high as an ornamental and timber tree for this section.

The dwarf mountain pine is perfect in hardiness and with a little training makes a beautiful and reliable lawn tree.

The balsam fir is very pretty but rather short lived and not likely to do well without some protection.

The American arbor vitæ is one of our leading trees for ornamental planting in hedges and as single specimens. It cannot stand severe drouth in greatly exposed situations even after having become well established.

The golden arbor vitæ is about like the American in hardiness, but most persons have an aversion to evergreen trees that turn yellow.

The Siberian arbor vitæ appears to be more hardy than the American and is worthy of further trial. Several other types are of slower growth than American and about the same as to hardiness.

The northern red cedar is perfectly hardy, but I have several times bought those said to be grown from northern seed and in every instance have found myself sold, as nearly all died.

The European larch, though not an evergreen, is usually bought with them, and, being so very hardy and such a rapid and symmetrical grower, it should be largely planted for timber and ornament. The larch should be planted as soon as the frost is out in the spring, and evergreens from the first to middle of May.

The most essential point in regard to transplanting evergreens is that the roots be thoroughly moistened as soon as possible after they are taken out of the ground and kept constantly moist till they are re-set in a well moistened soil. If all the conditions necessary for the successful growth of evergreens can be secured for fruit trees, growth will be assured.

APPLES.

J. S. PARKS, PLEASANT MOUNDS.

As a member of the committee on apples, I have very little of interest to report to the society. I commenced early in the season to enquire and look about for something new and worthy in the way of seedling apples or experience with new and untried varieties. I caused a notice to be inserted in the public press of this part of the state asking for any information about new or rare kinds of apples, but received no response.

The season just past was a fairly good one for fruit in this part of the state. The dry season caused fruit to be rather smaller than usual, but a good crop of apples was secured, and a large amount was put upon the market that brought remunerative prices. In my own case I raised over one hundred varieties, several of them seedlings that appear to have some merit, but none that so far appear to be of sufficient worth to put forward for public favor. A few varieties that are keeping well in our warm cellar would seem to be good keepers and may prove valuable after more thorough trial.

With us the *keeping* problem seems to be more difficult than the raising. We have been troubled with the *bitter rot* and a sort of scab rot in the cellar, that has destroyed some varieties entirely, such as the Snow and the Talman Sweet, that should have kept sound long after this date. Our cellar is large and well aired but rather warm, which may be the trouble. There have been no insect pests appearing to injure our apples; but the hot, dry weather or some other cause has caused the blight to be more severe than for several seasons past.

CONDITIONS FAVORABLE FOR FROST.

A clear, still night succeeding a day on which strong northwest or west winds prevailed and there is a manifest lowering of the temperature.

The average dates of the last killing or damaging frost in the agricultural regions of Minnesota ranges between May 2nd in the southeast and May 28th in its northwest portion.

Biography.

JOHN H. STEVENS.

(SEE FRONTISPIECE.)

John H. Stevens was born on the 13th day of June, 1820, which will make his age seventy-five years this month. His father and mother were natives and citizens of Vermont, but he was born in what was then called the Eastern Townships of Lower Canada, which were settled by people of New England a few years previous to his birth.

While yet a minor, he went to the lead mines near Galena, Ill. After some years there, he moved to Mineral Point, Wis., from which place, in 1846, he went to Mexico, returning in 1848, at the close of the war. In April, 1849, he came to Fort Snelling and made a claim that year on the west bank of the Mississippi, which included the primitive and original site of Minneapolis. This city has been his home ever since.

Throughout his whole life he has been engaged in and always taken a lively interest in agriculture, and especially in horticulture. He was an intimate friend of John A. Warder and other prominent horticulturists, pomologists and agriculturists. He has been called to many offices of trusts and responsibility since his residence of forty-six years in Minnesota.

He became a member of the Minnesota State Horticultural Society first in 1868 and was created an honorary life member in 1880, being one of three gentlemen, as the record stands, who were at that time so honored, and the first names placed on the life roll, with the exception of that of a lady, Mrs. Wm. Paist.

He has been a constant attendant at our meetings and an unwearied worker in the cause, though he ever declined to accept the honors of office, often tendered him, till at a very late date he finally accepted the office of vice-president, which he continues to hold.

During the years 1893 and 1894, he was president of the State Agricultural Society and in that capacity engineered, in the face of much discouragement from the adversity of the times, one of the best state fairs ever held in Minnesota; certainly the cleanest from a moral standpoint, as he refused point blank to countenance any of the weaknesses that often disgrace such occasions.

No man is better known throughout the Northwest as an earnest friend of the tiller of the soil than "Col." Stevens, and we hope that many peaceful years may be allotted to him in the decline of his life in which to fully realize the gratitude and affection of those for whose interests he has ever unselfishly labored.

THE HORTICULTURAL EXHIBIT AT THE STATE FAIR.

(I take pleasure in publishing the following communication from the secretary of the State Agricultural Society.) SECRETARY.

HAMLINE, MINN., May 22, 1895.

A. W. LATHAM, SECRETARY—*Dear Sir:*—A copy of the premium list of the State Agricultural Society for the fair of 1895, to be held September 9 to 14, 1895, has just been mailed to each member of your society.

I desire to call particular attention to the horticultural portion of the list as this has been revised with the purpose of drawing out a full display of fruits, vegetables and flowers from all parts of the state. Wyman Elliot, an officer in both the agricultural and horticultural societies, will have charge of the exhibit, and with the support which he will have from both organizations, it is safe to predict that the horticultural display will be one of the prominent and attractive features of the coming fair. Permit me to urge that each member of the horticultural society interest himself and contribute something toward the general result and thus help to make the exhibit all that it ought to be and one that will stimulate the more rapid growth of our constantly developing horticultural interests.

The prospects of a great fair are exceedingly bright. The board of managers intend that it shall be instructive, entertaining and fully representative of all the great commercial and industrial interests in the state; furthermore, the people generally are taking an interest in it. It is apparent that better times are at hand; that there are to be more abundant crops and higher prices, and under these conditions it is safe to predict a successful fair.

Yours with respect, E. W. RANDALL, Secretary.

PEACH CULTURE IN MINNESOTA.

G. F. FLATIN, SPRING GROVE.

Peaches can certainly be grown in the open air in Minnesota if the right precaution is taken to protect the trees in winter. The best winter protection is to lay down the trees. This is done by digging away the dirt from the side to which the tree is to be laid down; then bind the tree down to the ground, fill in the dirt around the roots, cover the main stem with earth and then cover the entire tree with straw.

The amount of straw necessary will depend on the size of the tree. I have used about one load of straw for three six year old trees.

In the spring remove the covering and dirt, lift the tree and replace the dirt around the root.

To prevent the trees from blowing over, tie to a stake. Small trees may be left without a stake. Always bind the tree in the same direction when laying down.

The profitableness of the culture of peaches will depend on the supply of straw for winter protection. When straw is plentiful and of little value, peaches may be grown profitably for market or home use.

Home grown peaches picked ripe from the tree will always demand a good price in the market, as no peaches shipped in will compare with them in quality.

Your Corner.

THE PRESENT STATUS OF THE MINNESOTA FRUIT CROP.

In reply to an inquiry of President Underwood he sent me a box containing branches of various kinds of fruit, and, if sign language can be safely interpreted, it means that apples are blossoming and setting fruit fairly well; grapes are somewhat injured by the frost and will produce about one-third of a crop; gooseberries and currants have set well, especially the North Star currant, which shows extraordinary development. SECRETARY.

(The following letter came later.—Secretary.)

There seems to be a good show for all kinds of fruits at present writing. The greatest injury was done to strawberries, grapes and plums. The first three frosts did it, the others being light. They got hit worse out in the country—that is, harder frosts,—but they were not so far advanced as here. Two men from south of Rushford were here Saturday, and say that apples are a good crop there, and, yet, frost killed the oaks.

The damage to strawberries by frost this spring will average at least one-half of the fruit, the Jessie, Sharpless, and Princess being hurt the worst, and the Michel's Early is not in very good condition. The Warfield seems to be in better condition than any other variety, and Haverland next. Parker's Earle seems to be in pretty good order for a staminate variety, and Mt. Vernon, Capt. Jack, and Wilson are pretty fair.

We think that straw covering is a good protection against frost. Some of our plants were uncovered early and some late, and we find that these that were uncovered latest are in the best condition. In regard to location, we consider ground that is high and dry very good for this purpose, as where the ground is low and damp the frost has injured the plants more.

Lake City, Minn., May 27, 1895. J. M. UNDERWOOD.

Owing to the last season's drouth and the cold, dry winter, the most of the blackberries and red raspberries were so badly injured that they have been cut off to the ground; consequently, no fruit this year. Black raspberries not quite so badly injured, but will be a very light crop; strawberries wintered fairly well, but the late frosts have destroyed one-third to one-half of all blossoms and buds that were out; fortunately, only a part were far enough along to be destroyed, and we hope, if nothing farther overtakes them to injure, to have one-half to three-fourths of an average crop of strawberries. M. W. COOK.

Rochester, May 24, 1895.

My fruit is not all destroyed. My prospect is good for a fair crop of apples; my cherries the same; currants good; also, raspberries on new lands; blackberries a failure; strawberries but little injured; grapes badly killed. M. PEARCE.

Chowen, May 26, 1895.

Apples uninjured by the frosts, the older varieties not bearing much, Hibernal and many of the Russians very full of fruit; plums in some situations ruined by frost, but at our place the greater share of the crop is safe and fine, the Cheney especially promising; grapes frozen back, but appear to have a good reserve of fruit buds that may yet give us a fair crop; raspberries quite generally winter-killed, but showing less injury from frost than might be expected; strawberries very unpromising—winter injury and spring frosts have reduced the prospect to a fourth of a crop or less. In general the hope of a fair crop is still left us. CLARENCE WEDGE.

Albert Lea, May 22, 1895.

Strawberries all, or nearly all, gone by the late frost; red raspberries died last winter on account of last year's drought; black raspberries look quite good, and I will have two-thirds of a crop; blackberries all dead; apples not hurt. Will have a good crop of Wealthy and Longfield and other Russians, Duchess and crab apples; will not bear heavy, but trees in good condition.

Rochester, May 22, 1895. R. C. KEEL.

In some places on high land and well sheltered by trees, there will be some apples and plums, but in many places the crop of apples, plums and cherries will be a total failure. Strawberries and raspberries were seriously injured by the frost. The fore part of May the fruit prospects were never better for everything but raspberries; they were badly winter-killed. The frost of May twelfth destroyed the most of the fruit and froze some of the gooseberries and currants.

Winnebago City, Minn., May 22, 1895. S. D. RICHARDSON.

The apples are all right except on very low ground where the late frost took them; my blackberries show a good many dead canes; raspberries are killed about half way down; strawberries did not do well last summer and are pretty thin, but are blooming good; gooseberries and currants are very full; grapes got frozen very badly—my Moore's Early stood it the best of any. I think the apple crop will be a big one. S. CORP.

Hammond, May 23, 1895.

I estimate the average apple crop at one-fourth, mine the same; plums one-eighth; strawberries one-half; raspberries one-eighth; currants one-half; North Star currant well loaded. Transcendant crab not bearing this year; Minnesota crab blossomed full and is getting to the front as a crab apple. E. H. S. DARTT.

Owatonna, May 23, 1895.

The frost of the 12th made a pretty clean sweep of all fruit, and the next two or three have about finished the business of any except very late kinds. Currants will be about a quarter crop; all red raspberries in this part of the country were killed to the ground at the beginning of spring. Think there may be a few plums. MRS. J. STAGER.

Sauk Rapids, May 23, 1895.

Frosts have occurred nearly every morning for twelve days, and garden vegetables and nearly all fruits have been seriously injured. Strawberries promise but 25 per cent. of an average crop; black raspberries 60 per cent.; red raspberries 60 to 75 per cent.; currants and gooseberries 60 per cent.; blackberries nearly average; grapes 10 per cent., and many vines killed to the roots; plums about 25 per cent. of average; apples 50 to 75 per cent., according to location. Nursery stock and young orchard trees suffered considerably last winter from root killing; wild fruits and nuts nearly all killed by frost. J. S. HARRIS.

La Crescent, Minn., May 23, 1895.

Red raspberries uncovered are almost entirely killed; black raspberries are not injured so much; currants and gooseberries will be a fair crop; grapes and strawberries are not much injured; plums will be a light crop; apples are promising a large crop.

Eden Prairie, May 24, 1895. JOHN R. CUMMINS.

The outlook for fruit in this locality is not very good. The raspberry canes came through in very poor condition and will not bear over one-third of a crop—the dry weather last summer affected the bearing canes; strawberries are not much better, as they set very few good plants last season—will probably have one-half crop; blackberries are looking fairly well and promise to bear a very good crop; currants are loaded with fruit and prospects good for an immense crop; grapes are set full of fruit, but were probably cut down one-fourth on account of frosts; gooseberries are good; apples and plums set well with fruit. C. W. SAMPSON.

Eureka, May 24, 1895.

All fruit killed by frost except currants, gooseberries and grapes, which will be from one-fourth to one-half of a crop; raspberries killed by dry weather last fall; vegetables badly damaged. Fine growing weather. J. M. DOUDNA.

Alexandria, May 24, 1895.

Apple trees partially injured by frost; ditto, currants—one-half crop of each; gooseberries not injured—full crop; raspberries (old plantations) destroyed by drouth and wintering; young plantations, where covered, O. K. The forest tent caterpillar is working on fruit trees and will destroy the crop, if not removed.

Harrison, Minn., May 24, 1895. N. P. ASPINWALL.

I think the continued frost has injured the fruit crop. Strawberries that were uncovered early are destroyed, nearly ruined; where not uncovered but worked themselves through the mulch, may prove a fair crop. Grapes all at present ruined; plums are nearly ruined; apples are not so much injured; raspberries and blackberries were badly killed in the winter and must be a light crop. The dry weather last year and dry, cold winter without snow have done most to cause a light crop this season. WM. DANFORTH.

Red Wing, May 24, 1895.

The raspberry canes are badly killed where they were not covered, and the crop will be almost an entire failure; the strawberries on low land were badly injured; currants will be a fair crop; the apple crop will be light, the Duchess and a number of new Russians on my own ground being good, but generally the crop will be light—the Wealthy remarkably light; it does not appear to be a Wealthy year.

Viola, May 24, 1895. WM. SOMERVILLE.

The fruit trees on my place—that is, apples, plums and cherries—blossomed a good deal this spring, but at least two-thirds of the blossoms were damaged by the frost, and also the grapes. So I don't think there will be much fruit this year.

Waconia, Minn., May 24, 1895. ANDREW PETERSON.

There are going to be a few Duchess and Wealthy and some Virginia and Early Strawberry—other varieties are very scarce in fruits, but all making a good growth of wood, which, after last seasons freeze and drouth, is much more acceptable than a big crop of fruit and no trees left. Small fruits, or, at least, strawberries and raspberries, are going to be a very light crop in this vicinity. J. P. ANDREWS.

Faribault, Minn., May 25, 1895.

Strawberry crop nearly ruined; thinking seriously of plowing the old beds up. Grapes damaged by frost about twenty per cent.; currants and gooseberries about the same; raspberries and blackberries uninjured; plums not seriously hurt—think the trees as full as they ought to bear. Can't see that apples are injured in the least; trees unusually full; if not injured by blight, crop will be the largest for years. E. J. CUTTS.

Howard Lake, May 28, 1895.

(Communications were received from several other members, too late for this issue.—Secretary.)

A COMMENDATION.—"I cherish the warmest regard for your leading spirits with whom I used to meet twenty years ago, a few of whom remain. Their discouragements were great and their courage and works were *grand*, and truly they have *borne good fruit*."

Cordially yours,

Wauwatosa, Wis., May 20, 1895. J. S. STICKNEY.

WISCONSIN FRUIT NOTES *for the Minnesota Horticulturist.*—Work at twenty institutes and a continual correspondence the past winter convinces the writer that there never was a time since his connection with the work of the Wisconsin society that there was more desire for information on horticultural subjects than at present. Our legislature wisely appropriated four hundred dollars at its last session to establish and equip a trial tree station at some northern central point where it would be of value to the entire state south of its location. Prof. Goff and the writer spent several days the third week in April examining some points about the latitude of Minneapolis—north of the forty-fifth parallel. We found fine fruit soil and good trees of the hardy varieties that had been planted from one to sixteen years; found Duchess, Wealthy, Wolf River, Hibernal, Tetofsky, No. 20 and a few others full of blossom buds and starting from the terminal buds. High land, suitable soil and hardy varieties are the main requisites.

I have planted six seedling pear trees this spring as a memorial to my esteemed friend and our co-worker, Geo. P. Peffer. It seems, so far at Pewaukee, to be free from blight, very hardy, about the size of Flemish Beauty, though not so good in quality. I found a top-worked tree last season in Jefferson county, well loaded with pears and no sign of blight. It was worked on apple stock, and the stock resembled the Northwestern Greening. I secured cions, after sampling the fruit in the fall, and have top-worked a few trees with good success, choosing the same variety of apple stock that I found them on. I am also trying it on Virginia crab, and, if that proves a success, I am far from pronouncing pear growing, at least this variety, a failure in Wisconsin. I have top-worked Scott's Winter, Wealthy, Newell, Utter and Bret's No. 1 with a few for trial this spring. My top-worked Wealthys promise a full crop, but blossoms are ten days in advance of last year. The Grimes' Golden has borne annually for three years with one top-worked. I find trees that suffered in 1894 from frost while in blossom are taking the present season to recuperate and show no signs of bearing fruit. A. J. PHILIPS.

West Salem, Wis., May 4, 1895.

PUMPING FROM DEEP WELLS.—A. F. S., Nebraska.—We have some rich table lands, but they are high, and the swells vary from 100 to 200 feet and more. Would like to irrigate, if only a garden spot. Can you give us the experience of those who have tried deep-well pumping? Give depth of well, size of cylinder and discharge pipe, power used, amount irrigated, and the success.

My pumping plant consists of a 7-inch 50-foot-deep well; 5x20-inch brass-lined Macdonald cylinder; 2½-inch discharge pipe; 12-foot Dandy Steel Windmill, and reservoir 25x36 feet, four feet deep.

This plant watered 2¼ acres last season, when the rainfall amounted to but 5 3-16 inches from April 1 till November 1. We raised a variety of vegetables and fruits.

Used vegetables and fruits all we wanted in their season and canned fruits and kept vegetables to abundantly supply our wants until they are grown another season.

Vegetables sold $375.06 and fruits $18.35; and in spring set strawberries, grapes and other small fruits that gave no income, amounting to ⅞ of an acre. This plat is included in the 2¼ acres, total amount irrigated. J. F. GANSON, Lodge Pole, Neb.

Secretary's Corner.

ADDITIONS TO LIBRARY.—There have been a large number of volumes added to our library since the beginning of the year, the titles of which will, probably, be published in the next number of the "Horticulturist," and we hope to have space in the later numbers for this year to make extracts from them of such topics as are of value to horticulturists in Minnesota.

A CORRECTION.—In the biography of Mr. J. S. Grimes, appearing on the first page of the last (May) number, Mr. Grimes is made to appear as a relative of "Little Horse Harry." This is a provoking blunder on the part of, first, the typesetter, who can hardly be excused, as the copy was typewritten; neither does the proof reader desire to shirk the responsibility of such an error, as *everybody* knows this gallant revolutionary officer was "Light Horse Harry," one of the most noted military characters of that era in history.

SECRETARY RANDALL'S LETTER.—

Please note carefully the letter in this issue from the secretary of the State Agricultural Society, Mr. E. W. Randall. He is taking hold in earnest to make the next fair a success, and we believe he should and will receive the support of every good citizen of the state in his work. Look over the list and see what you have to take or send and plan to be represented at the next state fair. It should be the cleanest fair ever held in the state, as liquor selling within a mile of the grounds and pool selling were both abolished by the last legislature. This is what we want, and let us show it by our acts.

AMATEUR FRUIT GROWING.—I wish to call special attention to Prof. S. B. Green's work on Minnesota fruits entitled "Amateur Fruit Growing." This work is written from a practical standpoint, with reference to its application to that interest in Minnesota. It is a very good and safe guide to this industry in our state and should *without fail* be found on the table of every fruit grower, amateur or professional, gardener or farmer in our state. The price is low—50 cts., in flexible cloth cover, and it can be had by mail upon application to the secretary of this society. Add this book to your library at the *earliest opportunity*. It has received the official endorsement of the executive board of this society.

NOTICE OF

Summer Meeting, 1895.

The summer meeting of the Minnesota State Horticultural Society will be held Thursday, June 20, 1895, at the State Experiment Station, St. Anthony Park, Minn.

It has been two years since a meeting of the society was held at this point, and the changes which have taken place in the intervening time will have much to interest those who have heretofore attended our summer meetings held there. Those who have found it inconvenient to attend these summer meetings, hardly realize how much they have missed. At this point is located the experiment station, under the patronage of the United States government, and here are conducted a very full line of experiments intended to cover all branches of agriculture, including, of course, horticulture, stock growing and kindred industries. There is very much to be seen and learned at this point, and especially in horticulture at this season of the year, the opportunity is a very full one.

As usual, the forenoon will be spent in the examination of the grounds, and at one o'clock the members will sit down to a picnic dinner, to which all who attend, as is customary, are invited to contribute. The flowers and fruits which always appear in profusion at these gatherings, will be used to adorn the tables and to please the palate.

Following the dinner hour will be the announcement of awards, and the usual afternoon meeting, at which a few short papers may be read, followed by discussions and impromptu speeches. No formal program has been prepared. It is suggested that a pertinent topic for consideration at this time is "Late Spring Frosts and their Relation to Fruit Growing" and members are invited to come provided with thoughts on this subject.

Your attention is especially called to the liberal premiums offered

for strawberries, and it is hoped thereby to secure a very full exhibit of this fruit.

Bring your family and friends to this gathering, which will be an very informal one, and is intended to offer an opportunity for renewal of acquaintance and mutual encouragement in the good work of the society.

The grounds may be easily reached from either St. Paul or Minneapolis by trains over the G. N. Railway, stopping at St. Anthony Park depot. Visitors from Minneapolis on the Interurban Electric line, should get off at Cromwell avenue; those from St. Paul, should take the Hamline car and get off at Raymond avenue. Carriages will be in waiting at these points during the forenoon to convey parties to the grounds.

For further information address

J. M. UNDERWOOD, President, Lake City.

A. W. LATHAM, Secretary, 207 Kasota block, Minneapolis.

PREMIUM LIST.

All exhibits must be entered with the secretary and in place by 12 M., to be entitled to compete for premiums.

Exhibitors competing must be members of this society and the growers or makers of the articles exhibited. The fruits, flowers and vegetables exhibited must have been grown in Minnesota and must be correctly labelled.

No premiums will be awarded on unworthy exhibits.

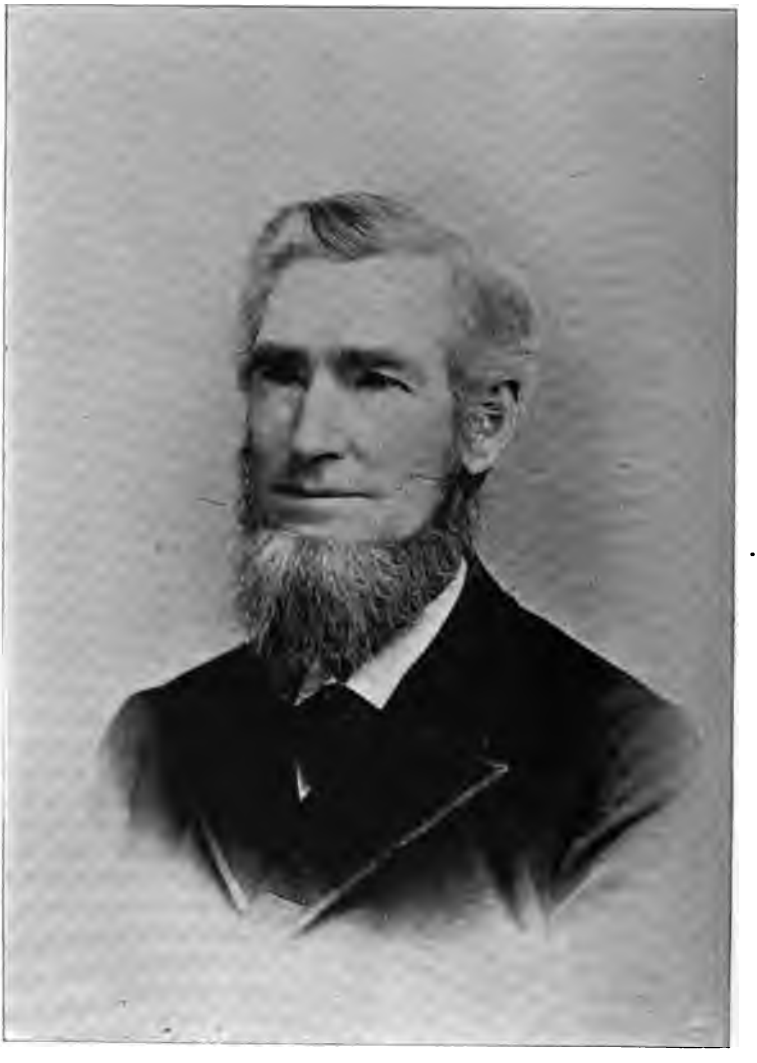
	1st prem.	2d prem.	3d prem.
Collection of cut roses, out door grown	$4.00	$3.00	$2.00
" " " greenhouse "	3 00	2.00	1.00
" " " carnations	3.00	2.00	1.00
Bouquet of greenhouse flowers	3.00	2.00	1.00
" " annual flowers	3.00	2.00	1.00
Floral design	5.00	3.00	

STRAWBERRIES.

Each variety exhibited, 1 quart.....1st prem., $1.00; 2d prem., .75; 3d prem., .50

VEGETABLES.

Collection, not less than six kinds	1st premium,	$3.00;	2d premium,	$2 00
Asparagus, three bunches	"	1.00	"	.50
Beets, six	"	1 00	"	50
Cabbages, three	"	1.00	"	.50
Cucumbers, six	"	1.00	"	.50
Green peas, ½ peck	"	1.00	"	.50
Lettuce, six	"	1.00	"	.50
New potatoes, ½ peck	"	1.00	"	.50
Onions, ½ peck	"	1.00	"	.50
Pieplant, six	"	1.00	"	.50
Radishes, six	"	1.00	"	.50
Summer squash	"	1.00	"	.50
Turnips, six	"	1.00	"	.50



Wm Somerville

VIOLA, MINN.

An Honorary Life Member of this Society.

(For biography, see index.)

THE MINNESOTA
HORTICULTURIST.

VOL. 23 JULY, 1895. NO. 6.

Summer Meetings, 1895.

WISCONSIN STATE HORTICULTURAL SOCIETY.

BY A. J. PHILIPS, SECRETARY.

The meeting was held at Grand Rapids under the auspices of the Wood County Horticultural Society. This is one of the many places in northern Wisconsin where the cutting off of the pine timber, the drying of the cranberry marshes and the burning of the blueberry bushes, is compelling the people to seek some new avenue or pursuit, and, with a soil well adapted to the cultivation of small fruits, that seems to be a subject in which the people manifest much interest.

The meeting opened with a fair audience, which continued to increase through the day and evening. The greatest regret we experienced was the failure of Proff. Goff to be present, and many were disappointed. The corresponding secretary read an interesting paper from Mr. Tobey, of Sparta, on the outlook of small fruits since the drouth of '94 and the frosts of '95. It showed that though much damage had been done the interest is unabated. Mr. R. J. Coe, the treasurer, presented a valuable and instructive paper on the new varieties of small fruits. Mr. Boynton, who has been giving away evergreens to the children, read a good paper on ornamental tree planting. Mr. Fred Hardin read a paper describing his experience in starting a fruit farm and managing a trial station.

The evening program opened with paper entitled "Our Wild Flower Shows," written by MissCornelia Porter, of Baraboo. It was full of good reasons why a wild flower and apple blossom show is a good thing to interest children in their school work.

A paper which seemed to please the audience was read by Miss Lulu Philips, of West Salem, on "Horticulture in Connection with our Common Schools." She was invited, by a resolution, to read the same paper at Madison at next winter's meeting. Mrs. Campbell, our ex-treasurer, who has read so many excellent papers to our society, again favored us with one on "Why Women Should be Interested in Horticulture." The health, pleasure and profit of the business were ably presented. Mrs A. S. Roberts read a paper entitled "Chronicles, Second Chapter." It was well prepared and alluded to many of the citizens in a pleasing way.

President Kellogg gave some valuable suggestions to those present on the handling and marketing of small fruits. The large acreage in the vicinity of his home at Ripon being nearly all handled, shipped and sold by their fruit growers' association, thereby insuring better prices and a better grade of berries. The secretary read an old story under a new name, the "Commandments of Apple Growing,"—the principal points being that if you desire to raise apples you must select good soil and location, buy the best trees possible and then plant a few trees every year as sure as spring comes. The subject of irrigation was discussed by Mr. E. Wolcott of Sparta, who has a plantation of about three acres of small fruits which he has successfully irrigated with an artesian well.

The show of strawberries was excellent when one considers the fact that the cry from all over the state after the severe frosts of May 11th, 12th and 13th was, "strawberries and grapes all killed." The Thayer fruit farm, of Sparta, secured the first premium on best collection and G. J. Kellogg, of Janesville, second. One noticeable feature of the exhibit was that a smart old gentleman named Tennant, who only lacks a few weeks of being ninety years old, picked a nice quart of both Warfield and Haverland himself and brought them to the meeting and received the first premium on both. The show of flowers and roses was fine. Mr. Kellogg, of Janesville, secured first on collection and on moss roses. Mr. Scott, of Grand Rapids, secured first on house plants, and Mrs. Townsend second. Their plants were fine. A Mrs. Jones showed some beautiful white roses. The show of vegetables by Mr. A. S. Robinson was fine, and, though he had no competition, it was well worthy of a premium. The general verdict was that all present had a good time. Resolutions thanking the citizens of Grand Rapids and the local society for courtesies shown, also to officers of state society for

holding the meeting there and invitations to come again were passed, after which the meeting adjourned.

(Through the courtesy of the secretary of the Wisconsin society the following papers, read at the summer meeting just held, were furnished the "Horticulturist" for publication. They are worthy careful perusal. Secretary.)

THE TEN COMMANDMENTS OF APPLE GROWING.

A. J. PHILIPS, WEST SALEM, WISCONSIN.

(Read at Summer Meeting, 1895, Wis. State Hort. Society)

I. Thou canst have no other fruit more easily grown, handsomer in appearance, more attractive or that contains more of the elements that tend to produce good health or prolong life than the apple, which has been called by men of all nations, kindreds and tongues, and very properly, too, the "king of fruits." And to grow it successfully in the north, you must plant some good trees every year.

II. Thou must not select the low, frosty ground for thy orchard, neither shalt thou plant it on poor, sandy soil or barren places, neither on land that has been made too rich by alluvial deposits these many years, for this will cause the young trees to grow too fast and make the branches thereof to be tender. If thou doest the foregoing which I have commanded thee not to do, then as Moses' father-in-law said to him, so will the practical apple growers say to thee, "Thy way is not good, and though thou shouldst plant some trees every year thy success nor thy profits will not be great in the cold north."

III. Thou shalt select high, well drained land with a clay soil, and if it contains stones, even limestone therein, it will do no harm; but I say, verily, it will be a benefit, for moisture will be formed and the dampness caused by the rains of heaven falling on it will thereby be retained in the soil around and about the trees, causing the little rootlets to grow and multiply and the tree to bear fruit in the appointed time, even though a drought should prevail in the land. As Moses built an altar on the hill, so, if thou wouldst avoid frosts in the spring-time, thou hadst better plant thy orchard on a hill, and, if thou shalt heed this commandment and plant a few good trees each year, then shalt thou and thy household have plenty of apples.

IV. Thou shalt select varieties that the chief men and the elders have found by years of experience and trial of even twenty years or more to be of sufficient hardiness to withstand any cold that may come upon them; also select those which have not cumbered the ground and have not been ordered cut down by the master or owner of the orchard because they were unprofitable and bore no fruit, but consult with those of thy fellows who are well acquainted with the various kinds—and above all take heed what I say unto thee and listen not to the smooth talk of the stranger who comes within thy gates and tries to sell thee worthless trees grown in far-away lands or distant parts of the earth, which are not well

suited to thy climate and which would prove an experience to thee that would be grievous to bear and, perchance, cause thee to break the third commandment given by Moses to his people. By doing as I have commanded thou mayst be filled with horticultural knowledge and wisdom and be found willing to impart the same to thy fellows, and then thou wilt be called wise and good hearted; and by planting a few good trees each year thou wilt not only have apples for thine own use but have them to give to the unbelievers in apple growing.

V. Thou shalt not select and plant the apple as the favorite fruit for thyself and thy wife, thy children, thy man servant or thy maid servant or for the stranger sojourning within thy house, and select thy best site and the best varieties, and then suffer thy orchard to be neglected and grow up to weeds and briars or become the abode of thine or thy neighbor's horses and cattle or allow thy sheep to gnaw the bark off the trees or the swine to break the roots asunder, for, verily, I say, this will cause damage, loss and disappointment to thee and thy household; but, on the other hand, thou must enter into the congregations of the horticulturists and ask questions one of another and learn the best and most approved way to cultivate and protect thy trees, in order to have them grow and bear fruit, even fifty and one hundred fold. Thou must be willing to learn of thy fellows and not be a stiff-necked people, saying thou dwellest in a land abounding with milk and honey, and thinking there is no need of apples for food; for without them the health of thyselves and thy families will be impaired, and thy days not reach three score and ten years; but heed what is said in this commandment and set a few trees each year, and thou wilt raise apples in abundance.

VI. Thou must cultivate and prune thy trees well in the early part of the season, rising up with the birds in the morning so that thy work will be done before the heat of the day oppresses thee, and ever remember the commandment given to the children of Israel to do the work in thy orchard in six days and rest on the seventh, and thou wilt find thy orchard a much better place to rest on the Sabbath, where thou canst hold sweet communion with nature's God, and admire thy growing trees and plants, than to rest on the banks of some stream trying to murder the innocent fish or in the fields or woods shooting for sport helpless birds or looking on at a game of base ball. In sojourning among thy trees on the Sabbath, looking at the growing or eating the ripe fruit, thy thoughts will wander back to pleasant hours spent with those whose counsels and efforts furnished thee with many of the trees in thy orchard. These to thee, if thou hast been a student of horticulture, will be sweet recollections that come only through the medium of growing apples by planting some good trees every year.

VII. Thou shouldst honor those that hold meetings and sit in council for thy benefit, and ever remember that to have an abundance of apples for thy family thou must follow the rules already laid down, and, in addition, thou must not plant all thy trees in one season, thereby getting more on thy hands than can be properly

cared for, and, perchance, a cold winter might immediately follow and destroy them, much to thy disappointment and loss; but as thou plantest thy other crops so shouldst thou plant thy trees, some each year, as I have repeatedly commanded, and success will surely crown thy efforts, and thou wilt be blessed with an abundance of apples during all the years that thou sojournest in the land of thy fathers.

VIII. Thou must not kill thy newly planted trees with kindness —that is to put a large quantity of water about the roots every day, as it is death to them to be continually in water; but must plant in moist earth, made so by rains and snows or by water carried from a well or spring; and after planting thou must immediately place some straw or litter about the tree to keep said moisture there and not allow the tender roots to dry up and wither. Thou must also educate and learn thyself or thy boys, or have the same done by others, to increase the hardiness and longevity of thy trees by budding and grafting them on the most hardy and vigorous stocks that thou canst find, ever remembering that the stock must be free from the dread disease called blight and must be a rank, strong grower to keep pace with the top. This work will not only be useful and beneficial, but it will interest thy sons in the business of apple growing; and by planting some of these hardy trees for stocks each year to graft and bud onto, thou wilt be able to change some of thy trees for the better each succeeding year; and by spending a few hours each week pruning and trimming them, they will soon have shapely tops and produce more apples and live longer than the same varieties on their own roots.

IX. Thou must not depend on getting apples for thyself and family by buying or stealing them from thy neighbor, providing thou hast a suitable location for an orchard, but if thou hast in thy possessions no good place, then it will be better and more honorable to thyself and to thy family and much more satisfactory to thy neighbor to buy his apples for a price, even if it be paid in silver, than to steal them, and thy family will be more likely to have a better supply. Remember, if thou plantest an orchard in the way I have commanded and carest for it as I have directed, that when the young trees begin to bear they be not allowed to injure themselves by overbearing; better, by far, pick off some of the fruit and cast it away, than to allow them to destroy their vitality by an overburden of fruit. When thy trees begin to bear be sure and fertilize so that the roots will have abundance of nourishment.

X. Thou must not covet thy neighbor's orchard, but plant one of thine own on the best site obtainable, planting varieties as heretofore commanded, and in addition find those that have borne profitably in thine own neighborhood for many years before and after the hardest winters; then take time in the eleventh month and cut off the past season's growth of cions for grafting; then procure roots of one year's growth, and in winter when the blasts of the north make it unpleasant to remain on the outside, thou canst sit by thy fire and do thy grafting and set some of them in the ground the coming spring right where thou intendest thy orchard to grow. These

never being transplanted, will make better and longer lived trees than transplanted ones, and it will only delay bearing one or two years at most.

Now, take heed to what I have commanded, and ever remember that the most important commandment is to plant trees every year, that thou and coming generations may have plenty of apples, and they will call thee blessed.

NEW VARIETIES OF SMALL FRUITS.

R. J. COE, FORT ATKINSON, WIS.

(Read at Summer Meeting, 1895, Wisconsin State Horticultural Society.)

This subject of varieties is, to my mind, one of the most important questions the fruit grower has to deal with, and this is especially the case with the commercial grower.

It has been my firm belief for some years that we are growing too many varieties of nearly all the small fruits to meet with the best success. This is especially true of the strawberry. Now, do not think that I am not in favor of new varieties, for I most certainly am. I believe that every fruit grower should test every new variety of promise that is introduced, for by this means only can he determine what varieties are best for him to grow. Prove all things and hold fast to that which is good, is good business sense for the fruit grower, but to discard those varieties that have no particular merit, or are no better than the ones you already have, is even more important and requires a good deal more courage, for it seems hard, and is hard, to pay a big price for a thing and after giving it good care and attention find it no better, and, perhaps, not as good as some we already have, and have to throw it away. But this is the only way we can hope to meet with the best success. Everybody is struggling to be in the front rank, and we must keep up with the procession or be hopelessly lost in the crowd. Now, I think it is perfectly safe to say that not more than one variety out of every twenty that are introduced ever becomes popular or is generally profitable.

Twenty years ago I started growing strawberries for market, and planted that year two varieties, the Wilson and Green Prolific. The next year I added Downer's Prolific and Triumph de Gand, and the third year I added about sixteen more varieties, more than one-half of which I do not even remember the names of now. I have been growing berries ever since, and of all that list of twenty varieties we are only growing one today, the old time Wilson. If you will take almost any small fruit catalogue of fifteen or even ten years ago, you will find few of the varieties are well known and perhaps popular today, and by far the greater part of them are only a memory.

In the discussion of varieties there are three distinct classes of growers to be considered, all having practically the same object in view, namely, the best possible results for the efforts put forth. The

first is the grower for the distant and large, or wholesale, market; second, the grower for the home, or near, market, and third the private gardener, or one who grows for his own home use. To those who grow for the distant or large market and ship their fruit to one wholesale house, it seems to me very important that they have but two or three varieties, for in this way only can a uniform product be sent to market, and thus the best success be attained. If your dealer can know that every crate of berries bearing your brand is just like every other crate, he can send them to his customers with perfect confidence, and you have established a reputation. If your berries are all good, your reputation is good also, and if they are poor, you will find it out when the returns come in. While I would not like to name the varieties—for every grower must determine this for himself—there are certain things that it would be wise to observe.

First, that your berries must be firm enough to ship the distance you are from your market and arrive in prime condition—sound, dry and fresh appearing.

Second, that they should be of at least a fair size; all other things being equal, the larger the better.

Third, that the berry should be of an attractive color. I do not believe a faded, washed-out looking berry will ever be popular in any market.

Fourth, that the pistillate and staminate varieties that are grown together should be as near alike in size, shape, firmness and color as it is possible to get them, and if you will have every fifth plant of every row a staminate of about the same size, color, etc., as your pistillate, you will get a more uniform product than is possible if planted in alternate rows, and the fruit picked all together.

Fifth, that in order to be uniformly profitable it must be a healthy plant, a good grower and able to produce a large, or at least a good, crop, under the varying conditions it must necessarily meet with at the hands of the different growers.

Sixth and last, but not least, that the condition in which the fruit arrives on the market depends as much upon the grower as it does upon the variety itself. While it is true that many varieties will never be really profitable or what a good berry should be, it is equally true that no variety can possibly be at its best in the hands of the careless, shiphod grower.

The grower for the home, or near, market where he can put his fruit into the hands of the retailer or consumer, may have a much wider range of varieties than the shipper.

Some of our very best home market berries would be very nearly worthless if they had to be shipped far. For the home market we may grow the largest varieties, even if they are not firm enough to stand much rough handling, and then, too, it does not matter so much if they are not all of exactly the same color. What we have to look for then in the home market berry is health and vigor of plant, great productiveness, large size, attractive appearance and good quality, and when we have it grown to put it on the market fresh, bright and clean looking,

While the market grower most of necessity consult the taste of of those to whom he expects to sell his fruit, as well as to grow the varieties that will give him a profitable crop, the man who grows his own fruit is bound by no such narrow limits. He may not only grow more varieties but may indulge his *own* tastes and fancies an d grow some kinds that would be unprofitable for market but may be just what suits him. It is to many a great pleasure and satisfaction to have the very finest that can be grown, regardless of the question of profit.

RASPBERRIES.

What I have said about strawberries holds good with raspberries, but not to so great an extent, for there is not so much variation in size, color, etc. In the blackcap class they all look a good deal alike, and different varieties may be shipped together without detracting from their market value.

What we have to look for then is good size, good shipping qualities and health vigor of plant, hardiness and productiveness. I may be pardoned, perhaps, if I name two or three varieties that seem to me to meet these requirements to a marked degree. With us the Palmer is worth all the other early kinds that we have tried put together, because of its fine fruit and great productiveness, and, what is very desirable in an early berry, it ripens its whole crop in a short time, coming on the market when prices are high.

The Ohio is always profitable because of its good shipping qualities, rank growth and great productiveness.

Prof. Budd says of the Older "it is by far the most valuable blackcap grown." It certainly is wonderfully productive of very large berries and seems to be heat and drouth proof and entirely hardy every way. If it had a little more firmness, I think it would stand well up toward the head of the list of blackcaps.

Of the older reds, the Cuthbert is the standard for growth, productiveness and quality and is, probably, better known and more largely planted than any one variety, and is, perhaps, the best with which to compare new varieties. In our own experience, however, the Brandywine has been the most profitable of all, never failing to give us a good crop of large, firm, bright, attractive looking berries that always meet with a ready sale.

There are two new raspberries to be introduced this season, a description of which,it seems to me,would be of interest to all growers and lovers of fine fruit. The first of them is the Loudon, a Wisconsin production, which originated with and is named after Mr. F. W. Loudon of Janesville, who is also the originator of the Jessie and Hoard strawberries. It is said to be a seedling of the Turner fertilized with Cuthbert. In growth and appearance of cane and in size, color, shape, firmness and quality of fruit, it very much resembles Cuthbert, and has the added value of keeping longer in good condition after being picked. The secretary of our state society, Mr. A. J. Philips, picked fruit of the Loudon on Thursday and, after carrying to different parts of the state, finally used it in his own home the fol-

lowing Monday, at which time he says was in very fair condition. Its special point of, superiority over Cuthbert seems to be greater productiveness, better keeping qualities, a longer fruiting season by a week or ten days and greater hardiness.

The second variety is the Columbian, which originated with Mr. J. T. Thompson of Oneida, New York. It was raised from seed of the Cuthbert that was grown by the side of the Gregg and is believed by the originator to be a cross between the two, and I think with good reason, as it seems to have some of the characteristics of both. As I saw it on the originator's grounds the past season, it was simply wonderful in growth of cane and productiveness, so much so as to be very hard to believe without seeing it. It resembles Cuthbert in shape, is somewhat darker in color, a little larger in size and very firm, and never crumbles or falls to pieces in picking or handling. In quality it is equal to the Cuthbert, and the originator claims it to be the best berry for canning purposes ever grown. It resembles the Gregg in that it never suckers like the reds but propagates from the tips, which to my mind is a great advantage. The berry will hang to the bush long after it is fully ripe, and will finally dry up if left without picking. I saw a third of an acre of Columbians that had been allowed to grow without any summer pruning, that stood ten feet high, and I was told that it picked 2,800 quarts of berries, or at the rate of 8,400 quarts per acre. Of course, it remains to be seen whether it will do this in other places. If it will, it is by far the most valuable variety ever produced.

BLACKBERRIES.

The only varieties of blackberries we have grown to any extent are Snyder and Stone's Hardy. They are too well known to need any description. Ancient Briton is doing well in most parts of our state and is very popular where best known. We have tried Erie and Minnewaski, but neither proved valuable with us.

CURRANTS.

This fruit has been grown very little for market purposes, but to the few who have grown it, it has proved very profitable. As there seems to be little difference in the prices they bring in market, it is safe to plant the varieties that yield the best crops. The demand for white ones is quite limited, and it would not be wise to plant largely of them.

GOOSEBERRIES.

Of late I have become considerably interested in gooseberries, and have been trying some of the newer ones, and it may be of interest to some of you to know how they compare with the best of the older ones. I have fruited so far the Industry, Red Jacket, Columbus, Golden Prolific and Triumph. Triumph is too weak a grower and too uncertain a cropper, unless it may be in very favorable situations where it may have partial shade, a heavy soil and high culture. Under these conditions it frequently produces splendid crops.

Red Jacket is a very strong grower and a heavy yielder. (Dr. Hoskins, of Vermont, says that he picked a half bushel of Red Jackets

from a single bush the past season.) Its berries are the color of the Houghton and about one-third larger than the Downing. It is not of fine quality, being quite sour and thin meated. It is hard to pick, the thorns being stiff and long and the berries growing all through the bush.

Golden Prolific is a strong, stocky grower and a good yielder of nice, golden berries, about like Red Jacket in size and quality.

Columbus is of the largest size, golden color and good quality. The plant is a sturdy, stocky grower and productive. I have a good opinion of this variety and think it will prove valuable.

Triumph. This pleases me the most of all the varieties we have yet fruited. It is a strong, free grower and enormously productive of very large, yellow berries of the best quality. It is the easiest to pick of all I have seen, the fruit being so large and so thickly set along the branches that they can be picked by the handful. There are very few thorns on the old wood, and those on the new wood are not very strong.

GRAPES.

There is an almost endless number of varieties, all of which, I suppose, are of some value in some places, but after trying nearly fifty of them, have come to the conclusion that the man that plants Moore's Early, Worden and Concord for black, Brighton for red and Niagara and Moore's Diamond for white, has a better assortment than if he had the whole list. I do not know about other markets, but find in our own home market that the black varieties will outsell the white ones. If I could have but one market variety, I think it would be Concord.

In conclusion, then, I would say to the market grower; get, and thoroughly test all the promising new varieties as they are introduced, giving them only such care and attention as you are able or willing to give to your main planting, and keeping in mind all the time that only about one in twenty will prove of more value than the ones you already have. When you have become satisfied that the new one is better in every way than the best old ones, then, and not until then, is it advisable to plant largely of that variety.

EVERGREENS FOR SHELTER AND ORNAMENT.

W. D. BOYNTON.

(Read at the Summer Meeting, 1895, of the Wisconsin State Horticultural Society.)

As a practical people living in a severely practical age, let us first consider this subject from the point of utility. Looked at from this standpoint, we have several good reasons for advocating the general planting of evergreen shelter belts, among them the following:

First. For protection against the cold winds and driving storms of our severe northern winters and securing a more even distribution of snow. Second. As a retainer and conservator of moisture during the long, dry spells, which seem year by year to become

more severe and trying in this section of the country. Third. For the protection of our stockyards and grounds, that the life of both man and beast may be made more comfortable and profitable.

To serve the first named purpose, we should partially enclose our orchards, gardens and grounds, particularly on the west and northwest, with an almost solid body of sturdy evergreens. If planted thickly, say five or six feet apart, this belt, or screen, will not attain great height, which is not necessary or desirable. Fifteen to twenty feet in height answers the purpose admirably. By leaving this enclosure open on the south and a portion of the east and north, a free circulation of air is assured. Our most trying winds and storms of winter, coming as they do from the west, southwest and northwest, would be much modified by this protecting belt of evergreens. No doubt, you have all observed the effect of such a shelter belt. It is not at all like a high board fence or a wall, which the wind sweeps over and drops down, and on again, and if it chances to be a driving snow storm leaves a huge drift to mark its impeded course; but when this driving snow storm enters the living wall of green, it seems to be chopped up fine by the millions of needles of the conifers, and the snow sifts down on the inside gently and evenly as though there were no driving storm outside. In this way an even distribution of nature's great protecting blanket, snow, is secured for our plants and shrubs within.

The second reason for the general planting of evergreens for shelter in point of utility is that they are conservators of moisture. This has been made very plain to me in the last two or three years in my evergreen nursery, and I can best illustrate my point by giving some of my own experience and observation. Among my blocks of evergreens from which we dig and ship each season, tracts of land are annually vacated which, in the order of rotation observed, we plant to ordinary farm crops or to small fruits which we wish for plants or fruit. Whatever I have planted in these narrow vacated plats has thriven remarkably well and has formed full, heavy crops, notwithstanding the severity of the drouths of the last two seasons. Last season, for instance, our crops of strawberries on these small plats were the largest we have ever had; while other patches on lands quite similar in character, where the evergreens were lacking, were badly dried up and produced little, if anything. I can only account for it by the presence of protecting bodies of evergreens. I would say here that we have no large evergreens in these fields, nothing as a rule over four or five feet high, and most of them much smaller, but as the growth is solid and close to the ground, those drying winds could not lick up the moisture and carry it away.

Now, a single row of large, wide-spreading evergreens will do much to retain moisture and protect lands to leeward from the sweep of the drying winds. I firmly believe that it would pay the fruit grower to plant rows of evergreens north and south at distances of, say, thirty rods apart, with the trees six feet apart in the row. They are not grass feeders and do not exhaust the adjacent lands as do the Lombardys, for instance.

The third point named in way of utility is the protection afforded

to our stockyards by the presence of these belts of evergreens. It would be idle for me to press this point, for every owner of a horse or cow is well aware of its truth. All animals need exercise in the yard, and it is good economy to protect them from the fierce winds while they are getting it. Here again I say that it would pay the farmers well to plant a sheltering belt of evergreens.

WHAT AND HOW TO PLANT.

For the shelter belts before mentioned, we should plant the hardiest and most rapid growing varieties. Throughout the Northwest the list for this purpose has practically simmered down to the Scotch and white pines and the Norway spruce, with the Norway spruce far in the lead. The Scotch pine ranks next in demand, I find. This latter is the most rapid growing of all the evergreens, but is rather coarse growing in habit. The Norway spruce is a fairly rapid grower, heavily rooted, safe to transplant, more symmetrical in form and decidedly the favorite as an all around evergreen, both for shelter belts and single specimens. All things considered, I would advise the planting of Norway spruce three feet high for our shelter belts. These can be had for about twelve to sixteen cents each if bought direct from the nursery, which is the right way to buy trees and plants of all kinds.

Never set evergreens in a stiff sod. If possible, have the land prepared one year or more ahead. That is, if it is now in sod, plow a strip where you intend to plant your shelter belt ten to twelve feet wide and work it thoroughly this summer if you wish to put out your belt next spring. Land should be in fairly good condition but not freshly manured. By having a strip worked up the width just named, you will be able to cultivate both sides of your rows, and this is what all trees want. Cultivate this row just as you would a row of corn. No extra care is needed. Don't cultivate deep enough to disturb the roots nor close enough to sway the tops much. Aside from these precautions, I would add nothing to the manner of corn culture. I find it all right for my trees. Cultivate for three or four years and then seed down, if you wish, and it will be all right with them. Plant only in the spring.

Send your order in to the nursery, so that your trees may be shipped just as the buds are swelling nicely. Take the cover off the box as soon as the trees arrive, wet down thoroughly, *tops* and *roots*, before removing from box. Plant as rapidly as possible, using water freely on both tops and roots, taking care not to get the soil so "mushy" as to allow the trees to sway about in the wind. Water heavily every few days if a dry time comes on soon after planting, and water occasionally through the first summer. Use only good surface soil against the roots in planting, and tread heavily above the roots after all the dirt is in place. Thorough firming of the soil about the roots is one of the principal points in successful tree planting.

EVERGREENS FOR ORNAMENT.

We find the list for this purpose quite an extensive one. In addition to those named for shelter belts, I would particularly mention

the arbor vitaes for low ornamental hedge purposes—of which the American justly takes the lead—the spruces, white and blue, the red cedar, Austrian pine, cluster pine and balsam fir. For its compact growth, beautiful color and symmetrical shape, I would place the blue spruce at the head of the list for single specimens in lawn planting. For grouping in parks and large grounds, the pines and Norway spruce are excellent. As a rule, these single specimens have to be planted in the sod. If properly done, this is all right, but it is a waste of time, effort and money to chuck an evergreen or any other tree, in fact, into a tough sod, where only a small hole has been dug barely large enough to receive the roots. The right way is to cut out a nice, true circle, at least four feet across, peel off the sod and replace with nice mellow earth, spading the whole up together thoroughly and deeply and plant as before directed, keeping the ground within this circle well cultivated for two or three years and then allowing it to grass cover.

Another excellent use for evergreens, especially in suburban grounds, is the screening of unsightly objects, such as out-buildings and the unsightly back yards of adjacent lots. Here, again, the spruces are excellent, and should be planted about the same distance apart as directed for the shelter belt.

One word of caution to those who are planting in lawns and small grounds, and I will bring my paper on this subject to a close, and, that is, to carefully take into consideration the ultimate size and spread to which your tree will attain. Don't plant too thickly. A cluttered lawn or yard is an abomination, both unsightly and unwholesome. Few have the courage to take a tree out after they have grown it for years. Plant sparingly and seek to develop perfect specimens.

HORTICULTURE IN CONNECTION WITH OUR COMMON SCHOOLS.

MISS LULU PHILIPS, WEST SALEM, WIS.

(Read at the Summer Meeting, 1895, Wisconsin State Horticultural Society.)

To be plain and practical we will define horticulture as the growing of fruits, flowers, vegetables and ornamental plants. By far too many of us find when we engage in the active business of our lives, that while our education in grammar, history, philosophy and algebra has been thorough, that some of the minor studies have been sadly neglected, which would add so much value to us as teachers and citizens. While there may be exceptions, I believe the boy who is taught early in life to plant and care for trees and flowers on the school ground will be more interested in his studies and will have more respect for his teacher, if the latter will take pains to educate him in the work. He will give better satisfaction and command better wages to work in the garden or on the farm, or will be better fitted to be the owner or manager of the farm and home. He would also be more likely to grow fruit for his family or beau-

tify his home, where his wife spends her time and his children receive their first lessons in life, than he would had his attention never been called to these things on the school ground. I believe, also, that the girl who is taught to care for and love plants and flowers on the school ground will have something instilled in her mind that will better enable her to fill her allotted sphere in life, whatever it be.

I once applied for a situation to teach school where two teachers the winter previous had made failures. The clerk said: "I do not care for your certificate or your education, what I want to know is, have you got sand." He did not even ask if I knew anything of horticulture. He said, "Our school money was thrown away last winter—the boys raised the 'Old Harry,'" was his expression, "whittled up the desks, climbed out of the windows, ran home during school hours." To make a long story short, he said, "If you can teach the school and keep order, I will pay you. If not, you can quit and go home." My father was with me, and intimated I had better let it alone, but I had an ambition to try it and engaged to teach on those terms, provided the other members of the board consented. But I confess when I went to the schoolhouse and saw the condition of things, my courage nearly failed me; but the contract was made, the board agreeing to put the house and surroundings in proper repair, and I agreeing to keep them so if I could.

School began, and as soon as I could I began with the assistance of the smaller boys and girls to arrange and make flower beds and beautify the grounds. As the larger boys began to come, I found them to be quite as willing to assist in caring for the plants and flowers as they formerly were to destroy the property. I taught there three terms and had the satisfaction of knowing I had no serious trouble with any pupil and could have held the position longer. The board said one thing was certain, if I could not accep the position another year, the one who did must continue and care for the flower beds.

I would say to you this evening that, from the standpoint of a teacher, it is far more pleasant and gratifying to be out among the boys weeding the flower beds and transplanting flowers than it is to see them playing marbles for keeps or learning to smoke or chew tobacco. When parents realize the fact that the large majority of the children in Wisconsin receive the larger part of their education in the common schools, they ought to feel the necessity of instituting the inquiry, "What system of education will best fit them for usefulness?", and the study and practice of horticultural pursuits is, in my opinion, one of the best plans to adopt. The nature lessons, which should be conducted in all of our schools, I find can be made very interesting. One pupil, I have in mind, that it seemed impossible to reach until one day we had a lesson on leaves and the different ways they were situated on the branches. He came the next day with a splendid lot of branches, showing that he was interested in that line of study.

If we endeavor to advance our work more and more along this line, the education will be more practical, our school will be

better, teaching more pleasant, horticulture will take a long stride in advance and members of the state society will not say, "We have no more members than we had twenty years ago." What pleasanter thought for a young man to cherish when he leaves the place of his birth than to realize that he helped to plant trees and flowers on the school ground and around the old home. My father says that some of his pleasantest hours are spent in his memorial orchard, which recall the pleasant hours with such horticulturists as Peffer, Wilcox, Tuttle, Plumb, Springer, Kellogg, Dartt, Smith, Daniels' Hirschinger, Cook, Hatch, Grimes, Jewell, Sias, Gaylord, Patten, Gideon and others.

Horticulture inculcated in the minds of our children at school, will show itself later in beautifying the cities of the silent dead. How much our hearts have ached in seeing those places neglected and growing up to weeds! But I am glad to say that within the last few years there has been a marked improvement in our country in their care. Like other reforms, the ladies have taken hold, and flowere are blooming on every hand. A former resident of the town where I live, who is now dead and lies in our cemetery, was once one of our school officers. He planted a nice lot of elm trees in our school yard at his own expense, and they now afford a pleasant shade. Are not these living monuments to the memory of Mr. C. C. Palmer?

In conclusion, let me say: Do we as teachers, to whose care the fathers and mothers of this state commit the training of their dear ones, do all we can to benefit their children? Can we not in addition to their other studies instil in their minds a love of horticulture? I have not much fear of a girl or boy who brings a beautiful bouquet (like the one on the president's desk) and places it in the school room. In the spring I generally take a plant to school, and you would be surprised the way they come with their plants. We hardly realize what flowers express. I understand that the most noticeable token of respect on Memorial Day at Viroqua to the memory of Wisconsin's beloved ex-governor and soldier, Uncle Jerry Rusk, was the magnificent floral display, his work in agriculture and horticulture represented by a large plow made of beautiful flowers. Then, let us unite horticulture with our common schools in such a way that they cannot be separated! Then we will have model schools, model school grounds, and that will create a desire for model homes and model farms, where fruits and flowers abound. Then, perchance, it will be heralded abroad that Wisconsin has model teachers, and by their help and co-operation, you, the members and friends here assembled, may in future years be impressed with the belief that you have a model horticultural society.

(One other paper, of equal value with the foregoing, on account of lack of space will appear in the August number. Sec'y.)

SUMMER MEETING, 1895.

MINNESOTA STATE HORTICULTURAL SOCIETY.

BY MISS E. V. WHITE, MINNEAPOLIS.

The summer meeting of this society was held at the State Farm School, St. Anthony Park, June 20, 1895. Although no attractive program had been prepared or particular effort made to advertise the meeting, yet the friends gathered in goodly numbers, there being over a hundred present, making as large an attendance as often gathers at the summer meeting. The beautiful day and the easy reach from the Twin Cities proved attractions enough, to say nothing of the warm welcome which the members knew from past experience would be accorded them by their hosts, the professors at the station. The officers and members of the executive board were nearly all present, and many of the old familiar faces, without whom it would hardly seem possible to have a horticultural meeting.

Many availed themselves of Prof. Green's invitation and were shown about the grounds and fields of the Station to examine the growing crops and see anything that was new in the way of cultivation or of machinery. The ladies and others not wishing to venture into the hot sun gathered on the lawn under the trees to renew old acquaintance or to examine and enjoy the excellent display of fruits, flowers and vegetables entered to compete for premiums.

The exhibit of flowers was very fine indeed, and special mention should be made of the large and handsome collection of out-door roses from the grounds of the Jewell Nursery Co., at Lake City. Notwithstanding the unfavorable season there was a very large show of strawberries, including all the principal varieties (see award of premiums further on). Lunch was served at about one o'clock, which was, as usual on these occasions, in the nature of a basket picnic. Following came an informal program of after dinner speeches, at which President Underwood presided.

(Of the following responses only a few notes were taken, as our reporter was unable to be present.)

President Underwood gave a kindly greeting to the members, suggesting to those who were not members that they ought to become so. He also referred to the previous pleasant meetings at the farm school, this, the largest, speaking well for the place of meeting and for their entertainers. Col. J. H. Stevens was

first introduced and asked to respond to the toast, "Our Hosts, the Professors at the Experiment Station," he responded briefly somewhat as follows:

Colonel Stevens: I don't know what I can say on this beautiful June day where all about is so propitious, but I wish to bear willing testimony to those professors whose labors are fraught with so much that is beneficial to Minnesota. I never speak ill of a man if I can help it. I believe in the old adage, "The laborer is worthy of his hire." And I am glad to say that this beautiful farm, started under the auspices of Professor Porter, whom we all revere and who has recently gone to his long home, has found in Professor Green a man worthy to follow in his footsteps. All the professors seem especially adapted to do the work before them. Everything speaks for itself,—the beautiful growing crops, garden, the trees, everything indicates that it is under the tutelage of men worthy of their hire. And to these men who have thus labored so effectually we offer our most sincere thanks.

Under "Thoughts of the Hour" Prof. S. B. Green gave an interesting resume of the work and present condition of the farm school. Among other things, he said: "It affords me great pleasure to see you here today, and all my colleagues are in thorough sympathy with your aims. Every one wants to see this work brought to a successful issue in this state. So we are always glad to see you and will do what we can to entertain you when you see fit to visit us. I didn't know what my subject was until I got up, but as ministers sometimes take a text and then talk about what they please, that is what I am going to do, and I shall talk about what we are doing at the farm.

"There has been a serious loss of trees that have stood the winters well heretofore, while cherries, apples and plums never came through the winter in better shape. Strawberries and raspberries are not doing well. They were somewhat injured during the winter and, also, by the drouth of last year, but were not affected by this season's frost. Learning a lesson from last summer, we are paying more attention this year to vegetables, especially to potatoes and tomatoes. We are also paying a good deal of attention to garden machinery and garden tools. A great many letters come to us on garden subjects, five times as many as ever before. There are a great many letters about potatoes. The prospect is that potatoes will be down pretty low this fall. We are carrying on experiments not only in varieties, but in combating the rot and blight.

"As to our school work, perhaps it was never so successful as the past year. There were 200 in attendance at one time, with a total enrollment of 365. Seven years ago when you met here, there was just one student in the department of agriculture. The girls' department was introduced a year ago. This year a dressmaking department was added which bids fair to be very popular. The instruction to girls comprises lessons in domestic economy, physiology and hygiene. There was not so large an attendance this year as last, but we think the work more of a success, as while there were fewer from the Park, there were more from the agricultural district surrounding. The course lasts but six weeks. We think this will eventually result in admitting girls to the regular school.

"The last legislature made an appropriation of $65,000 for new buildings. One building is already started to be used as a dormitory and for cooking. We shall now be able to get along some time, but, if the school continues to grow as it has in the past, it will not be so very long before further room will be needed. The capacities of the dairy building will be nearly doubled; other buildings will be sheep pens and barns, and there will be minor improvements about the place.

"It is not so good a time to show off the place when there are so many people. There is not time to go over half of it. I have 16,000 plants. Prof. Hays has a great many thousands in his department. Then the work is so scattered that it is difficult to show it in a short time. We shall be glad to have you come at any time and study the work."

Mr. F. H. Nutter was called upon to respond to "Should the Useful always Be Made Beautiful?" He spoke as follows:

When my attention was first called to this question I understood, of course, that I was expected to maintain the affirmative side, but, as I farther considered the matter, I encountered a dilemma of magnificent proportions; my inner consciousness said to me—"*You* claim to be useful as occasion may offer, therefore—"; so you see the difficulties which ensue when we attempt to carry the simplest proposition to a logical conclusion. Fortunately, however, the question has an impersonal side which may be pursued with safety, and to that we will turn for a few moments.

It is often insinuated that this land of ours extends but a chilling reception to the fine arts, and there, doubtless, is good reason for the charge to a certain extent, but we may plead in defense that in the hurly-burly of building up a new world many things are neglected that when we have time to stop and take breath will probably receive different treatment.

Every one who is interested in machinery has often taken pride in

the examination of some master piece of Yankee ingenuity, perhaps a loom, a locomotive or a printing press, especially if it stood alongside of its counterpart of English or Continental origin; the first of light and graceful design and bright with paint and polished metal, the latter, simply strong, to be sure, but heavy and clumsy, and funereal of aspect with its coat of dark paint; and been ready to claim that the American does not hesitate to *try* at least to combine use and beauty, if sufficient inducement be offered, especially, we must confess, if that inducement be of a financial character.

But when we turn to the surroundings of our country homes, we find nothing in the comparison in which we can boast; to be sure, we may plead that when the years of our natural life are measured like theirs by the millenium rather than by the century or even decade, as is now the case, things will be different; we can also call attention to the severe climatic conditions we have to combat, and safely assert that, if ever we should be so situated that three days of rain, three of fog and one of cloudy weather would be styled a pleasant week, we would be able to produce lawns equal to those of "Merrie England."

Let us, however, return to our subject. Why is it that to most minds the two terms, use and beauty, seem so incongruous? Is it not on account of a misconception of the true meaning of the word "beauty?"

To too many minds this word suggests grandness, an overloading with inappropriate ornamentation and, what is perhaps worse, an unrenumerative expenditure of time and money. To these I would say that true beauty in anything will not interfere with its highest usefulness; when it does the essence of its beauty has departed.

How then shall we apply this to our homes? First, for what are our homes established? The political economist will inform us that the home is the unit from which the nation is made up, but we will not consider it in this connection.

To many of us the home is the scene of our daily business, and so nothing will beautify it which interferes unreasonably with our regular task; but to all, the true home stands as a place of refuge to which we turn when our day's work is over to gain in the company of our family and friends the rest and strength, both bodily and mental, which shall fit us for the toil of the morrow, and it is for the purpose of obtaining the restful surroundings we so much desire that we turn to the trees, the shrubs and the flowers for their grateful aid. So we plant a group of trees and shrubs here to hide the barnyard or the shop, that the thought of our usual employment may not force itself too prominently on our resting time; we search the swamps for the woodbine or bittersweet to give the pleasant shade for the veranda; we place a couple of evergreens to frame a distant view, and so place upon the walls of our private art gallery a picture, ever changing with the home or the season; and, perhaps, on the borders of the lawn a bed of hollyhocks, larkspur and monkshood will remind the elders of the old homestead in the East.

And, then, as we rest after the day's toil and gain fresh strength and courage from the breezes which rustle the foliage and bear the perfume of the flowers, our minds turn with gratitude to the goodness and bounty of the Great Artist and Gardener, who at the creation united to its fullest extent the useful and the beautiful, and with his omniscient judgment pronounced it all "good."

The president next introduced Dr. M. M. Frisselle, who was announced to speak of "The Development of Horticulture." The Doctor said that the secretary had added, after assigning him a topic, that he could alter it, or speak of anything he pleased, and so he took the occasion to tell in a very pleasant speech something of the development of horticulture from a biblical standpoint. He said:

I will speak of the development of horticulture, and I will be brief, as I don't know much about it, for I want to say only what I do know. No matter how far back in the history of the world we go, the clergymen claim to know all about it. This world has existed a good deal longer than some have supposed; some say 60,000 years, and perhaps that would not cover it. I don't know what they did in horticulture 60,000 years ago, but I will come down to the Garden of Eden. Everybody knows all about this. The clergymen have told us all about it. The fruits and flowers there are reported to be very fine, but I mistrust their being so fine as reported. I believe they had no such roses as these. They had fig trees, but those had no blossoms that showed. I don't believe they had any strawberries, and on the whole, I don't believe the horticulture in the Garden of Eden began to compare with that of today. Getting along to Noah, we find he had a vineyard. I know there is a good deal of enjoyment in a vineyard, because I have one myself. Noah and his boys enjoyed cultivating their vineyard. We even know that he got "high" on the fruit of the vine. They must have grown some pretty good grapes. I have seen a variety of grape called the Syriac, with clusters more than a yard long. I believe in the growth of the grape.

Solomon did something in the way of gardening and of beautifying his ground, and I think was a pretty fair horticulturist. You know the ladies did a good deal in husbandry in those days, and he had a good many ladies to help him, and I think all the fine work in his garden was done by the "wife." Then there is Nebuchadnezzar. I always liked Nebuchadnezzar for one thing—not that he ate grass—I think he ate salad; but I have always liked him for one thing; he always tried to please his wife. She came from a mountainous region, and when he brought her to the prairie country, he built for her the hanging gardens which are so famous in history. I think that I shall speak the sentiment of the ladies, when I say that Nebuchadnezzar after all had some good qualities. In Egypt they did a good deal in agriculture, but I don't suppose they could quite equal this place. They didn't have greenhouses, but they had a good many leeks and onions. The Israelites groaned some when they went out to Egypt, because they didn't have enough onions.

Apples in those days were not like ours. They had no Wealthys or Jonathans. There were the apples of Hesperides, but they were a kind of orange. They cultivated olives. The olives of Palestine, of Syria, of Spain, all have a history.

Coming down to our country, we see how slowly things develop, yet every year we see a wonderful improvement. Things are growing better, sweeter, larger. In fifty years I don't know where we will land, but I presume we shall be a great deal happier than we are now in the products of our gardens and our orchards.

The next on the program was the rendering of a poem, "The Dignity of Labor," by Miss Dixie Smith, which was given with rare expression and was much appreciated.

Mr. J. T. Grimes was appropriately called upon to respond to the toast "Horticulture from the Standpoint of a Veteran." He began by saying that as veteran means "something old," he supposed he would answer. He drew a manuscript from his pocket from which he read as follows:

Ladies and Gentlemen: I am expected to make a few impromptu remarks, and being taken by surprise, of course you cannot expect much at my hands.

What do I know about horticulture from the standpoint of a veteran? Veteran, I suppose, means old and worn out, and in that respect I am able to fill the bill. I might as well state before I begin that "I was borned in the Old D'minion, right dare among de niggers, but was fotched up among de white folks, and know'd some of de fust families berry well." They always wore seedy hats and manifested a general appearance of that sort, talked politics exclusively and knew but little else.

We had no horticultural societies then; they are all creatures of a later growth. Our fruits were all seedlings, and no one supposed that we could improve on nature.

We now claim that some of our best fruits have originated from sports widely different from the parent tree. All the sports we knew anything about at that time were our fast young men. If one tree happened to bear better fruit than the other, all the boys in the neighborhood knew about it, and the owner must be content with what he could get. Hence, he did not care to improve his fruits—not even for the sake of the boys.

I was there, and I know we used to have glorious times at the apple parings which were held around in the neighborhood, and where each boy paired off with his best girl, or at least tried to. We had no such thing as fruit dryers then; the sun did the business with the assistance of the flies, the bees and the bugs. The fruit was placed upon scaffolds out of doors, or hung on strings about the old fire place. Pumpkins were sliced and strung up in the same manner to dry, and such delicious pies Auntie could make! Auntie, you understand, was not a real name, but meant par excellence, and denotes the highest degree of honor bestowed upon the darkey cook.

The fruits grown at that time were not very inviting, and, consequently, there was little market for them; in fact, no one thought of growing fruit for that purpose. I never saw a cultivated strawberry until after I was grown. There were some wild ones growing along a ditch in my father's meadow, and he used to trounce me for tramping down the grass to get a taste of those berries. Is it any wonder that I am such an enthusiastic horticulturist?

I believe it was Massachusetts that first set the ball in motion, with such men as Marshall P. Wilder in the lead.

What has been the result? Horticultural societies have been formed and extended throughout every state and almost every county in the union.

What are we doing? Experimenting, not blindly but scientifically, in the production of newer and better varieties of fruits and flowers, always holding fast the best, until something better is attained.

I shall not attempt to show the vast increase of business and wealth attached to the growing of fruits. Look at the business done by the railroads in this department alone! What immense quantities are handled and shipped in every direction where there is a demand and a market. The North requires the early ripened fruit of the South, besides the tropical fruits which are grown there exclusively; and the South in turn looks to the North for the later fruits and also for her supply of winter apples, besides many other fruits which cannot be grown there to any extent. Transportation is so direct, quick and cheap, that each section of the country may be said to produce every variety of fruit through the exchange of trade, as though it had been grown upon its own soil.

But how has this wonderful result been brought about? Through the means of influence of any particular section or society? No; but through the united efforts of all the societies of all the states combined, working together for the common good. This concerted action in a measure controls the markets, systematizes the handling, packing and shipping of fruits, regulates charges, commissions, etc.

Now, let us turn to Minnesota, as one of those states having a distinct, yet undivided, interest in common with all the others stated. She has been the child of circumstances from her birth, located so far north as to be almost beyond the limits of fruit-growing. It has been said, and I believe truthfully, that any country that could not grow its own fruits sufficient for the common wants of the people could never attain to a high state of civilization.

Does anyone here suppose, if all the difficulties that lay in the way could have been foreseen, that any one of these veterans would have been crazy enough to have attempted to form a horticultural society in Minnesota? But necessity knows no law. We must have fruits, and we went it blind; oftentimes reaching out our hands in error, expecting a prize, but receiving only a blank. When I look into the face of experience, it reminds me of the chaplain in the Confederate army who prayed most fervently that the Lord would give the soldiers more courage, when a veteran cried out, "We have courage enough already, pray for victuals."

Ye veterans, who have been fighting so long against such fearful odds, gaining a little here and a little there, begin now to see the silver lining that skirts the cloud that reflects the light from the opening gates of heaven!

But, in order to carry out this great work, there must be united effort on the part of every member of this society, and I would especially call your attention to the efficiency of our lady members. Nothing in life stimulates to action so much or makes our burdens so light, as the sound of a happy voice with the light of a pleasant eye. Those who wish to attend the apple paring should always come in "pairs."

Our younger members, in all probability, will not be required to sacrifice time and means with so little reward as those who have preceded them. The work of the society has been so well laid out and so skillfully managed, that there is not a thing beneath the sun but you have dreamed of in your philosophy. We have the State Experimental Farm right here, that is doing a grand work in the interests of horticulture, and then we have auxiliary stations in different parts of the state, that make their annual reports to the central head station. All these reports come before this society and are published in its transactions, and in addition runners are sent abroad everywhere to spy out the land and gather in the goodly fruits for the benefit of the commonwealth at large.

In regard to myself, I can only say that my pride runs parallel with that of a friend of mine who always boasted of having been born in Boston, and declared if he had to born again a hundred times he would go straight back to Boston every time. I have no wish to live my time over again, not even to correct the "mistakes of Moses;" but, if the mantle of youth could be thrown around me again, I should fall in with this society and pitch my tent within some garden of roses.

"The Modern Woman in Horticulture" was responded to by Mrs. J. M. Underwood in a pleasing, summer day soliloquy as follows:

A day in June! A perfect day! A blissful day! A literal day of rest! At peace with all the world! Just the day for communion with nature, knowing that the desire is reciprocal, for that she claims recognition from man is evident on all sides! It is Sunday. The duties of the past week are over—not all accomplished that had been laid out, but time limits everything and sixteen hours cannot be crowded beyond a certain point. The duties of the coming week hover around furtively striving for recognition, although notified early that this was a day of rest. The soft mellow air with undulating motion gently lulls every sense, and they too retire into space, and useless human nature lies inert. A spirit of unrest from the north comes floating through the air, stirs the peaceful quiet and asks what the "Modern Woman" is doing in horticulture? Whether it is an honest desire for information that prompts the inquiry, or simply that doomed to the misery of eternal motion it would therefore involve others in the same restlessness, is a mystery, the solu-

tion of which may be possible on a practical work-a-day, but disturbs not the present delicious spell of mental inactivity.

All alone—yet not alone—a sharp pointed pencil and paper of snowy whiteness for company. No one to speak, or to speak to. What wonderful ideas may not be drawn from the universal source! Just the moment for inspiration, but it cannot be forced. The mind must be in a receptive condition,utterly devoid of personal thoughts, in fact of all thought, perfectly passive. All is in readiness; what will come? The beautiful blue of the sky tempts many a winged creature to try the exhilerating effects of a *stroll* in ether; there is no necessity for undue exertion today, and they wander dreamily about. How beautiful the scene that greets the half-closed eyes! The group of Norways at the left towering way above the house looks protectingly down, assuring immunity from danger of intrusion in that direction. The oaks at the right, with motherly branches extending, a long way from the trunk, seem to urge the grateful shade of their foliage as free to the wearied toiler. The long branches of the weeping elm sway sleepily to and fro, and one of unusual length, carrying an oriole's nest near the end, describes an arc of several feet, but moves so slowly and noddingly that the influence is contagious and the care-troubled mortal on the veranda slowly but surely succumbs, and the head, empty of thought and ideas in unison, swings gently to and fro.

A passing zephyr whispers, "The Modern Woman," and the inane mortal slowly nods in response. The bee, going slowly to and fro, in deference to the day, hummingly repeats the phrase and starts into life the thought, what is a "Modern Woman?" The first effort at solution is put to rest by wondering if the oriole will make a mis-step and fall in trying to reach the nest on its upward swing. The same breeze brings such a delicious, permeating fragrance from the rose-bed that the whole personality seems wrapped in it, and for the time being all consciousness seems centered in the heart of a rose, and sweet communion is held with the power that makes such loveliness and sweetness possible.

"In Horticulture!" laughingly sings out the robin. "In what?" calls the quail. The feathered tribe all at once are imbued with the power of speech and mortal woman is dumb in their presence. Frequent repetitions bring the speakers no nearer to an understanding,and the catbird, hidden in the evergreen hedge, an amused spectator of the scene, mockingly screams and bursts into rollicking bubbles of musical laughter that brings confusion to the disputants, and the misunderstanding is more pronounced. The brown thrush, sitting on the topmost twig of the tallest Norway, meditating on the beauties of nature, suddenly feels moved to plunge into the light wave of restlessness that rolls in from the far-away disturbance on the ocean of activity and pours forth unlimited remonstrance and advice, and in fancy the ear not only hears but the eye sees the notes and words as they come tumbling down from that airy height and float around like thistle down, now here, now there, and causing no greater disturbance. His thoughts seem to follow the same course marked out by the robin and quail, for the

words and syllables, though oddly mixed in their lofty tumble, are as follows: "Culture, culture, horti, horti, mod-mod-modern, horticulture, horticulture, woman, modern, culture, horti," and so on, until there was a whole basketful of them and they, seemingly, covered the ground, and the dazed human being, sitting in rapt astonishment at the sudden evolution and revolution in nature whereby the birds are furnished with the power of speech, is dimly conscious of existence, and queries, wistfully, What has "Horticulture" to do with the "Modern Woman"?

Mr. William Danforth was called upon to give "Some Late Thoughts from the Fruit Fields." Mr. Danforth spoke briefly, but touched upon a subject in which all were deeply interested. Referring to the drouth of last year, and the results as seen this season in the runners not having taken root, he said he had learned the lesson to prepare for the dry weather, and he believed the drouth's ill effects could in a great measure be counteracted. All were much interested in the description of his well, which has just been prepared for irrigating purposes. A number of questions were asked Mr. Danforth, which drew out the following points: The well has a bore of six inches and is 496 feet deep. It is a flowing one and is situated at Red Wing on a bench of land of the same height as the city, about 55 feet above the river. It is an iron water, rather soft, of about 50 degrees temperature, good to drink and not too cold or injurious for the plants, at least no ill effects had been seen from this summer's use. This well has a capacity of three barrels a minute and will water an acre of land in a day. A two-inch pipe is used to carry the water to the field. It is carried part of the way by ditch and partly above ground, which tends to raise the temperature somewhat. The entire expense, with pipe and valves, was about $500. The 500 feet of two-inch pipe cost $78, the valves and other attachments $16, and 100 feet of two-inch hose $34.

Mr. A. J. Phillips, secretary of the Wisconsin Horticultural Society, being present, was called upon to say a word of friendly greeting. Following Mr. Danforth, he described the well of Mr. Wolcott, of Sparta, which was sunk last year. Having lost his berries two years ago from drouth, he sank an artesian well, which cost about $300 and is half as deep as Mr. Danforth's. It has a capacity of three barrels a minute. The water is conveyed in a two-inch pipe. Mr. Wolcott thinks the well paid for itself the first year and says that if he could not have a well he would not try again to raise small fruits. Last year, after mowing and burning his vines, he turned on the

water and let it run for three days. Some thought he was putting on too much water, but this year he finds that those vines which were farthest from the water are bearing the lightest. He ran the well every day through the drouth of last season, and this year his berries are much ahead of those of his neighbors.

In regard to the relationship of the Minnesota and Wisconsin societies, Mr. Phillips spoke of the enjoyment always experienced in visiting our meetings. He used to be a paid member of the society, but was now an honorary member for a term of years, which, he believed, was about out. He did not know whether he could get in again or not. He said; "We who attend these meetings always feel that we take away more than we bring. Our summer meeting has closed. I have thought perhaps that our summer gatherings were better than yours, as we have prepared programs and make more elaborate preparations. But after the experience of today I don't know but I shall have to pronounce yours the better plan. We had to wait two days before eating our berries, while you ate yours the first day. We thought we had the finest showing of roses that could be brought out; but your people have beaten us here today. But our strawberries are ahead of yours. We thought our berries were all killed, and it was a surprise to go to our meeting and find such a fine showing of berries.

Professor Green struck a keynote when he spoke of training the young in the principles of horticulture and of what Minnesota is doing in that direction. I was pained when I read the other day of the hundreds of children engaged in the bottling works of the city of Milwaukee. I am ashamed of it, as Minnesota and Wisconsin are always rivals. But I thought of what we are doing in the direction of making children interested in horticulture by the giving away of plants. And we are in hopes that this will offset in part the wickedness of the bottling work. We get some very amusing letters. The secretary had said that he would fill no applications that came after the fifteenth of May. A letter came from the northern region, however, which we had not the heart to refuse. It was from three children in the same family. The youngest was a boy of seven who wanted two evergreens to beautify his home. We feel quite proud of our work in this direction.

I am very glad to be with you today and hope the relations between our societies may always be pleasant. I met a young man on the train coming here today. He said he was trying

to be a horticulturist and asked me what was the best thing to do. I gave him a "Minnesota Horticulturist" and told him the best thing he could do was to subscribe for the magazine. He said he would do it.

Mr. Wyman Elliot, in responding to the toast, "Let us Return to the Soil," spoke somewhat as follow:" There are many ways of treating this subject. One way is to return to the soil an equivalent for what we get out of it. But perhaps the thought of the thought of the secretary was that there should be more people from the cities returning to the rural districts. And this is a grave question at the present time. He who hears the complaints and woes of today must think that the city is not the most fitting place for the poor. I have thought that if we could organize or colonize some of these people on small areas of land, with some one to instruct them in what to do, their lot might be made much better than what it is now. We have in Minneapolis over 7,000 laborers who are seeking employment today. The most have families, and many have known what it is to want for bread the past winter. It is a question that comes to us who are connected with city affairs, for these come every day begging for work, and we can't do much. Our hands are tied. I said to one big man, 'The best place for you is in the country.' He said he had been there, but could find nothing to do. So the problem is unsolved. Yet we believe that more should return to the soil, and that a way should be provided. I venture to say that no one here who has been cultivating the soil has gone without a a meal of victuals the past winter. I think perhaps it is within the province of this society to start some kind of a movement for getting the people from the congested quarters of our cities nearer to Mother Earth, and suggest that between now and our next winter meeting we see if something cannot be done in this direction."

Mr. J, S. Harris was then called on from the topic, "The Coming Apple for Minnesota—Will She Come and When?" He said: "We don't know much about the early history of Minnesota. When Colonel Stevens or I or some one else discovered it, it was occupied by a great trust of savage tribes who were engaged in raising buffalo or hair from the heads of the white settlers. When Colonel Stevens or I discovered it about fifty years ago we thought it was like the land of Palestine. Those who first came were fruit lovers, and they brought with them the apple and other fruits from their East-

ern homes. But it was soon shown that their apples were not a success. That other apple that grows on the pumpkin vine seemed to be the only apple that would flourish. But there was Peter M. Gideon. He sent down to Maine and procured some seed, and we have the Wealthy. That was a great advance and showed that an advance could be made. The Wealthy is a pretty good apple, but it does not quite fill the bill, and is not the coming apple. Another apple has come up. It has been heralded on all sides. It is the Peerless, and many are planting it. But that is not the coming apple. The people are awake to the importance of having an apple that is adapted to the climate of Minnesota, and on all sides there is the disposition to try seedlings. We will never be satisfied with what may satisfy the states south of us, or even Wisconsin. At the experiment station here they are awake on the subject and have promising seedlings. I have no doubt that there are seedlings now growing that will be better than anything we now know of. The coming apple is not yet here, but it will come. I may not live to see it, but there those here today who will see it. It will be more beautiful in color than the Wealthy, more juicy than the Baldwin and will have the flavor of the strawberry and peach combined.

A resolution relating to the death of Professor Edwin D. Porter was moved and adopted as follows: "Whereas, The death of Professor Edwin D. Porter has removed from us a most useful and beloved member:

Resolved, That in his death our society and horticultural interests have met a great loss, and that a committee consisting of Dr. M. M. Frisselle, Messrs. J. S. Harris and C. L. Smith and the secretary be appointed to draft resolutions of respect for publication and to be forwarded to the family.

In passing the resolution of respect to Prof. Porter, Mr. C. L. Smith was accorded the floor for a few words. He referred to the part Mr. Porter played in securing the location of the farm school on its present grounds, saying: "I know something of the long fight that occurred in connection with the transference of the school. I think Prof. Porter builded better than he knew. I have been throughout this country, and no state in the Union has a better location for such a school than we have. We have a model school of agriculture that other states may imitate but cannot excel. I believe that the state of Minnesota could do no better than to erect a monument at this place in honor of the man who was so instrumental in bringing the school to its present high standing."

The idea of perpetuating in some suitable form the memory of Prof. Porter was heartily received, Messrs. Harris, Jewett and others expressing their concurrence, the latter suggesting that a memorial in the shape of a building which might bear the name of Porter Hall would be a more suitable monument.

The time was approaching when members found it necessary to be leaving, yet others were loath to close what had proved to be so pleasant an session. Before the separation, Mr. Gould asked for a few minutes, which he took advantage of by returning some of the lavish compliments which Mr. Phillips had bestowed upon our state and society, suggesting that in some things Wisconsin was a little ahead, and that he proposed going over to study and learn from his neighbor over the river.

Mr. Harris referred to the recent death of Mr. D. A. Robertson, one of the pioneer members of the society and instrumental in its organization, suggesting that at the next meeting suitable action be taken in regard to the matter.

The meeting adjourned at 4:30 p. m.

AWARD OF PREMIUMS

At the Summer Meeting of 1895.

FRUIT.

STRAWBERRIES.

Articles.	Exhibitor.	Premium.	Amount.
Parker Earle	G. Johnson	Second	$ .75
Warfield	G. Chandler & Son	Second	.75
Michel's Early	"	First	1.00
Bederwood	"	Second	.75
Crescent	C. A. Sargent	First	1.00
Warfield	"	Third	.50
Monarch	"	First	1.00
Timbrell	Wm. Lyons	First	1.00
Enhance	"	First	1.00
Anna Laurie	"	First	1.00
Parker Earle	"	Third	.50
Bederwood	"	First	1.00
Lovett.	"	Second	.75
Saunders	"	First	1.00
Stayman's No. 1	"	Second	.75
Shuster Gem	"	Second	.75
Leader	"	First	1.00
Crawford	"	First	1.00
Sandoval	"	Second	.75
Wilson	Wm. Danforth	Second	.75
Bubach	"	Second	.75

Articles.	Exhiditor.	Premium.	Amount.
Crescent	Wm. Danforth	Second	$ .75
Monarch	"	Second	.75
Michels Early	"	Second	.75
Warfield	A. H. Brackett	First	1.00
Haverland	"	Second	.75
Lovett	"	First	1.00
Bubach	"	First	1.00
Capt. Jack	"	First	1.00
Princess	"	First	1.00
Crescent	"	Third	.50
Mt. Vernon	"	First	1.00
Parker Earle	"	Second	.75
Mt. Vernon	Jewell Nursery Co	Second	.75
Haverland	"	First	1.00
Capt. Jack	"	Second	.75
Princess	"	Third	.50
Van Deman	"	First	1.00
Workmans	"	First	1.00
Bederwood	"	Third	.50
Jessie	"	First	1.00

GOOSEBERRIES.

Triumph	W. Elliot	First	1.00
Triumph	E. R. Pond	Second	.50
Downing	Jewell Nursery Co	First	1.00
Smith's	"	First	1.00

J. S. HARRIS,
J. T. GRIMES,
J. P. ANDREWS,
Awarding Committee.

FLOWERS.

Cut roses, out doors	F. G. Gould	Third	2.00
Carnations	"	Third	1.00
Bouquet, greenhouse	"	Second	2.00
Bouquet, annuals	"	Third	1.00
Floral design	"	First	5.00
Cut roses, out doors	Jewell Nursery Co	First	4.00
Floral design	"	Second	3.00
Carnations	"	First	3.00
Bouquet, annuals	Mrs. A. A. Kennedy	First	3.00
Roses, out doors	E. Nagel & Co	Second	3.00
Roses, greenhouse	"	First	3 00
Carnations	"	Second	2.00
Bouquet, greenhouse	"	First	3.00
Bouquet, annuals	"	Second	2.00

C. W. SAMPSON,
MRS. A. A. KENNEDY,
Awarding Committee.

VEGETABLES.

Articles.	Exhibitor.	Premium.	Amount.
Cucumbers	G. Chandler & Son	First	$ 1.00
Turnips	E. R. Pond	First	1.00
Peas	"	First	1.00
Carrots	"	Second	.50
Swiss chard	"	Recommended.	
Lettuce	J. R. Cummins	Second	.50
Pie plant	Mrs. A. A. Kennedy	First	1.00
Radishes	"	Second	.50
Asparagus	Wm. Lyons	First	1.00
Pie plant	"	Second	.50
Collection	"	Second	2.00
Collection	E. A. Ostergren	First	3.00
Beets	"	Second	.50
Cucumbers	"	Second	.50
Asparagus	Wm. Mackintosh	Second	.50
Cauliflowers	"	First	1.00
Collection	C. W. Sampson	Second	2.00
Turnips	"	Second	.50
Peas	"	Second	.50
Beets	H. F. Busse	First	1.00
Radishes	"	First	1.00
Lettuce	"	First	1.00
Carrots	"	First	1.00

E. NAGEL,
ANNA B. UNDERWOOD,
Awarding Committee.

STAMP OUT THE ANTHRACNOSE.

Blackberry and raspberry anthracnose, or rust, is produced on the canes in the form of small, round or elongated whitish patches, slightly flattened and bordered with a ring of dark purple. These patches gradually increase in size and number, and finally destroy the new growth or stunt it badly. Upon the leaves it is often visible as very small yellowish spots surrounded by a dark border, resembling those on the canes and leaves. The fungus producing the disease passes the winter in the diseased canes and leaves, a fresh crop of spores is produced from the old spots in the spring, and the new canes and foliage are readily affected.

The raspberry anthracnose soon becomes deeply seated in the canes, and no fungicide can reach it. The disease can be greatly retarded by cutting out and burning all diseased wood. It should be cut out in winter or very early spring, below the lowest diseased spot. If the canes are then sprayed before the leaves start, with a solution of sulphate of copper, using one lb. to 25 gals. water, and if necessary sprayed two or three times during the summer with Bordeaux mixture, very little damage is to be feared.—Farm and Home.

Experiment Stations, 1895.

MIDSUMMER REPORTS.

CENTRAL STATION, ST. ANTHONY PARK.

PROF. S. B. GREEN, SUPT.

DROUTH.—The destructive effect of the terrible drouth of last summer showed very plainly in the severe winter killing of many plants that ordinarily would not be injured by cold weather. Trees growing close together and on dry land suffered most, and forest trees suffered more than apple, cherry or plum trees. The forest trees that were most injured are European white birch, European larch, black walnut, butternut, catalpa, wild black cherry, white pine, balsam fir, Norway pine; and many red and scarlet oaks growing in gravelly soil died. Strawberries and red raspberries were severely winter killed, although protected as usual, and that, too, where this trouble had never been experienced before. The bluegrass on very dry land also killed out. Trees and shrubs that were watered during the drouth show no unusual winter injury. Many other minor instances of winter killing could be cited, but they all go to show that we have far more to fear from a lack of water in the soil than from cold weather in winter.

THE LATE FROSTS.—The late frost this spring, which came just as the fruit buds of our grapes began to show, seriously injured them, though it did little other injury here. Our strawberry plants were not yet in flower when it occurred, and plums, apples, currants and gooseberries had set their fruits and, consequently, were not seriously injured. The flowers of several Russian pears were killed. No other serious injury was done by late frost to crops at this station.

SMALL FRUITS.—The small fruit crop here will be somewhat light, owing to the poor condition of the plants last autumn. Red raspberry canes that were covered with mulch only were, in many cases, seriously injured, while those covered with earth are all right. Blackcap raspberries covered with mulch or other material are in good condition and promise an abundant crop. Currants and gooseberries promise a good crop, the Champion gooseberry being, perhaps, more promising this year than any other variety growing here. Blackberries have set much fruit and look well. Juneberries of the most valuable kinds are heavily loaded with fruit, as is their usual custom. Among raspberries, it is interesting to note that the Logan berry has wintered well where buried and has set a fair amount of fruit. The same is also true of the Columbian raspberry, which is certainly a very strong growing kind, and in other ways seems to bid fair to equal the reports of the originator.

TREE FRUITS.—Russian cherries are many of them fruiting well for the first time and the outcome will be watched with interest. The Wragg cherry, at this writing, June 17th, is ripening its fruit, which is large and of good quality. The birds seem especially fond of it, and it has to be protected from their ravages. Our plums were never more heavily laden with fruit at this time of year, and all varieties promise good crops. In this connection, it is interesting to note that the dry weather of last season caused many small plum trees to flower this spring by checking their growth. This was quite conspicuous in a block of about 700 yearling plum grafts, many of which set fruit this year.

Most of our apple trees produced few blooms, but those set very well, and some varieties, notably those of the Duchess type, will bear quite a little fruit. The orchards never looked thriftier at this season of the year than they do now, and they are making a strong and rapid growth. The grounds of this experiment station never looked better, and each year adds to the beauty of the place by the growth of ornamental specimens and by general improvements. It is fast assuming the park-like appearance so desirable in grounds of this character. Three new buildings are to be erected this year at a total cost of about $65,000, and a reasonable sum will also be appropriated for improving the grounds adjacent to them. The labelling of the ornamental trees, shrubs and herbaceous plants with their common and botanical names is being made more complete, and has now come to be looked upon as a necessity.

VEGETABLES.—The experiments with vegetables this year are being carried on in a more complete way than usual. Variety tests are being made on a considerable scale with potatoes, tomatoes celery and onions and with other vegetables in a small way. The, experiments with potatoes also embrace the use of fungicides to prevent rot and blight; those with tomatoes, the use of fungicides to prevent tomato rot; those with celery are experiments in surface and sub-irrigation and those with onions experiments in transplanting onions. The experiments with varieties of potatoes is being carried on simultaneously in McLeod and Lyon counties, and the result will, therefore, be of much value and interest.

Experiments are also being made in the use of several different kinds of fertilizers. The results from the application of commercial fertilizers has not generally justified their use on an extensive scale in this section of the country. This year a special experiment was made in the use of nitrate of soda for spinach with excellent results. Fertilizers containing a large amount of the nitrates have long been looked upon in the older sections of the country as being especially valuable for early spring use on leaf crops. Our grain crops in this section, while increasing in the straw, have made little corresponding increase in the yield of grain. Applied to spinach at the

rate of about 200 pounds per acre, the result was very marked. The land receiving it yielded at least three times the crop produced on land receiving stable manure. The illustration herewith brings out this difference quite plainly.

Potato machinery is being made a special study this year. Six horse potato planters and two hand planters have been tried here this year, also three potato cutters, and we have several potato diggers and sorters now on hand for trial this autumn, and more are to be obtained before the crop is gathered.

FORESTRY EXPERIMENTS.—Experiments in forestry are ever subjects of interest to our people. The forestry plantation at this time is of much interest. Some serious losses of trees were sustained last summer, but these have been replaced by hardier kinds. The different kinds of native oaks are receiving considerable attention and are doing well.

In addition to the plantation here of about five acres, over four acres have been planted in different kinds of trees at our new experiment station in Lyons county. This plantation is divided into plats for the purpose of trying the value of different hardy trees in furnishing protection to those more tender. The work has been very successfully inaugurated.

ALBERT LEA STATION.

CLARENCE WEDGE, SUPT.

Although there has been nothing in the past eight years that has given our trees anything like an adequate test of hardiness, as the term is usually understood, there may be something of value in a detailed report of the behaviour of the varieties that we have fruited within the past few years. The soil at this station is a clay loam, with a retentive yellow clay subsoil, and the site of the orchard is becoming yearly more sheltered. The indications given and opinions expressed in this report must not be taken as at all conclusive, and will have little value except as taken in connection with like reports from other observers.

The trees have nearly all been kept in cultivation with growing crops or nursery stock between the rows. We mention the behaviour of several varieties that are pretty well out of the experimental stage in Minnesota in order that some intelligent comparison may be made with the newer sorts.

THE OLDENBURG.—This variety is perfectly at home in this location, and in this vicinity many trees about thirty years old may be found that are in perfect health. It seldom bears more than specimen apples before the ninth year. Our oldest tree, set twenty years, has acquired the usual bad habit of the variety of overloading with fruit in alternate years. Three years ago we tried to break up this habit by picking off nearly half the fruit when the size of hickory nuts, but without effect, as the tree did not bear a solitary apple the following year. A year ago when it was again overloaded with fruit, we made a more determined effort and shook off fully three-fourths of the apples when fairly formed. This severe thinning made but

slight change in the habit of the tree, which bloomed very sparingly this season; and we are inclined to think that in the bearing years the effort put forth in the production of bloom alone is so great that, if any considerable fruit is allowed to mature, there will not be vitality enough left in the tree to prepare buds for a crop the following season.

We placed several barrels of this fruit in cold storage last August, taking care only that all were sound and free from bruises. They were removed for family use at various times during the winter, and the last barrel taken out some time in January was in excellent condition and remained so when placed in our house cellar for two weeks or more. The experiment seemed to indicate that this variety if placed in cold storage directly from the orchard and kept until the beginning of winter weather could then be transferred to a cool house cellar and kept in good condition for a month or two, thus, with light expense, allowing us the use of this most popular and reliable fruit during nearly one-half of the year. The cost of cold storage at Albert Lea is 15 cents per barrel per month.

WEALTHY.—This variety set fifteen years has proved far less healthy than the Oldenburg. Sunscald and blight have crippled the trees, and of late they have shown injury in the forks, which appeared after the heavy crop of 1892 on fine trees that were otherwise in perfect condition. We have observed that the fruit appears to keep much better as the trees attain age, and that in cold storage its fine flavor is retained well through the winter. Top-working would seem to be the remedy for most of the defects of this tree.

TETOFSKY.—This variety set fifteen years has proved nearly as hardy as the Oldenburg, but somewhat more subject to sunscald. It is a profuse bearer in alternate years, and still furnishes our first ripe apples.

HIBERNAL.—Set eight years, this variety is in the most robust and perfect condition in every part of the orchard. It blights somewhat more than the Oldenburg but never seriously. It has generally borne good crops at from five to seven years from setting and specimen apples much earlier. The fruit is large and russet about the stem, showing almost half as much striping as the average Oldenburg; it hangs well to the tree and ripens well together, instead of dropping as the Wealthy is inclined to do. It keeps about with the Wealthy, and is regarded by us as fully equal to the Oldenburg for all culinary purposes, and in its proper season is relished as an eating apple by fully half the persons who taste it. In common with all varieties at our place, the crop of 1894 ripened prematurely and showed less beauty and quality than usual. Wishing to get the opinion of experts as to the value of the fruit, we sent the following questions accompanied with a basket of the apples to quite a number of our leading horticulturists, with the special request that the replies might not be flattering:

1. How do you like the Hibernal as a stewing apple?
2. As a baking apple?
3. As a pie apple?
4. Is it an apple you would care to buy if offered in the market at the current price?

Replies were received from every person to whom fruit was sent and are given in full below.

From President Underwood, of the Minnesota State Horticultural Society:

1. It is very nice.
2. Good.
3. As good as any.
4. It is not an attractive looking apple; unless I knew it, would take a better looking one.

From President Kimball of the Southern Minnesota Horticultural Society:

1. We like the Hibernal very much as a stewing apple.
2. They are very nice as a baking apple if enough sugar is used.
3. They are the best apples we ever had for pies.
4. They are a variety we should buy if they were in the market at the current price.

From President Burnap of the Northeastern Iowa Horticultural Society:

1. *First rate.* It is nearly as good as Duchess and needs a little more cooking.
2. Only fairly well, the skin seems tough and has a slightly unpleasant flavor.
3. It is *prime*, I know nothing better.
4. I believe it will make its own way in the market as a cooking apple without any help from anybody.

From Prof. Samuel B. Green, horticulturist of the Minnesota Central Experiment Station:

1. It is as good a stewing apple as any I know of.
2. Very good, indeed.
3. As nice as any I know of.
4. I would answer most emphatically, yes. Last winter (1893-4) we could not buy as good cooking apples as the Hibernal at any price. I am sure that as soon as this variety becomes known it is destined to be a popular market sort.

We also submitted a basket of this fruit to five of the most expert cooks of Albert Lea and received the following written answers to the above questions:

1. "It is very nice." "The Hibernal stews quickly." "Excellent." "Desirable." "Think they are fine."
2. "A good baking apple, as it is baked in so short a time thoroughly done." "It is excellent, juicy and tart." "Think it equal to the Duchess." "Excellent." "Desirable." "Bakes up soft and juicy."
3. "A good pie apple." "It is *very* good; of nice flavor." "Better than Duchess." "Desirable." "Equal to the Duchess."
4. "Yes." "Yes, sir." "One that I would take in preference to most on the market." "Desirable." "Yes, every time."

Aside from the prospective value of this variety as a hardy and reliable home and market apple, the tree seems to be of great value as a stock to top-work more tender varieties, as it seems to make a smooth union with a great many varieties and is inclined to push them into early bearing. We have in fruiting on this stock at this

station, Malinda, Newell's Winter, Haas, Plumb Cider, Peerless; all making perfect unions and in every case *more fruitful than the Hibernal.*

CHARLAMOF.—One tree of this variety, set ten years, has proved almost as healthy as the Hibernal. Its fault seems to be a tendency to blight, but it has never, in our worst seasons, been injured seriously; always ripens its wood perfectly and is today the picture of health. It has been a regular and very early bearer of apples that would ordinarily be taken for the Oldenburg, ripening at the same time; they are, however, more conical in form, firmer in flesh, of a peculiar, rich, vinous flavor and hang to the tree with great persistence. We do not find that the fruit keeps better than the Duchess, and it quickly loses its choice flavor when put in cold storage. It should be stated that our Charlamof is of spreading habit and light colored bark, the same as that reported by Andrew Peterson, M. Pearce, C. G. Patten and others, and quite different from that had by J. B. Mitchell, Wm. Somerville and A. G. Tuttle.

LONGFIELD.—Set eight years. This variety appears to be fully as hardy as the Wealthy and less subject to blight and sunscald. Its low spreading habit would of itself tend to prevent the latter. It has been the earliest and most prolific and persistent bearer of all on trial, one of the trees having borne a barrel of apples seven years from setting. The fruit will average somewhat below medium, but the quality is choice, and it keeps its flavor in the cellar rather longer than the Wealthy. It also, at the close of the season, hangs better to the tree, so that the entire crop may be gathered at once. Seems likely to be a valuable home and market apple for our section.

REPKA MALENKA (NO. 418).—Set eight years. This variety is, at least, as hardy as Wealthy and blights but little. Tree very upright in habit and splits down rather easily in the forks. It seems likely to be a good bearer, but not particularly early. Have not, as yet, had more than a peck from a single tree. Fruit decidedly below medium in size, fairly well colored and by far the best keeper of all we have fruited. In quality, while possessed of no particularly fine flavor, it is a fairly agreeable, mild acid, eating apple in the latter part of the winter and a very excellent cooking apple at any time. We think this deserving a general trial as an all winter keeper for the home orchard.

RUSSIAN GREEN (NO. 382).—Set ten years. This tree is of the Anis family, and there is none hardier in our orchard. It is almost free from blight, although at two different periods trees within four rods of it have been killed to the ground by blight. Although trimmed quite high, it has never shown sunscald. It has borne a few apples for the past five years and would, we think, have been well loaded the present season had it not been injured by the freeze of May. The fruit is below the medium size, rather prettily colored and of a very refreshing, pleasant flavor, especially when kept in cold storage. In the cellar it keeps about a month longer than the Oldenburg. If this tree proves a good bearer, it will be very valuable on account of its ability to resist cold.

ANTONOVKA.—Set ten years. We lost two of the three original trees and are not able to say just what was the cause of their death.

The remaining tree has always been reasonably healthy, although somewhat subject to blight. Its first fruiting was about a peck of magnificent apples, which it bore last season. Fruit large yellow, of refreshing, brisk, acid flavor and will keep a month or so longer than the Oldenburg. If the tree was free from blight, it would doubtless be of great value, as the fruit would sell on sight and would not disappoint the buyer.

YELLOW SWEET (No. 167).—Set eight years. A very hardy and perfect tree, has never been injured by cold or blight. Has borne a few specimen apples for several years, but set its first real crop the present season, which was largely destroyed by the freeze. This is a fine large, sweet, apple, of the choicest quality, that ripens nearly with the Tetofsky, but keeps far better. These who enjoy a good sweet apple as well as the writer will prize this variety highly, even if it does not bear as well as could be desired. There seems little room for doubt of its adaptation to a large share of our state. The fruit is in color light green with a bronze cheek.

SUMMER LOWLAND (No. 579).—Set eight years. A fine, vigorous tree with particularly handsome foliage. Appears to be as hardy as the Wealthy and very free from blight. So far a shy bearer. Fruit about medium in size, very handsomely colored, mild acid, fine quality. Keeps some better than Oldenburg. Of doubtful value.

WHITE TRANSPARENT.—Set eight years. A tree of medium hardiness that is very subject to blight. Has so far proved a shy bearer, and for this reason and because it ripens much later than Tetofsky, we think this may not be the true name of the trees we have. Fruit of fine quality, size and appearance.

CZAR'S THORN.—Set ten years. Fairly hardy, of slow growth and somewhat subject to blight. An early and good bearer. Fruit medium size, sweet, rather dry and insipid in quality and ripens before the Oldenburg.

OSTREKOF (4 M).—One tree set nine years. A vigorous hardy tree and seems to be much subject to blight. For some reason this tree did not start into good growth until about three years after it was set, so that, although it appears to be an early bearer, it has never blossomed freely before the present season. It has only borne a single specimen, enough however to prove that it is the true Osterkof.

PATTEN'S GREENING.—Set five years. This variety is of vigorous growth, seems to be very free from blight and gives promise of being an early and good bearer. Judging from the color of the wood after the past few winters, we should place the variety as decidedly less hardy than Duchess or Hibernal and, perhaps, not hardier than Wealthy. Fruit of fine size, green when picked but turning to a fine yellow in the cellar. Quality very fair as an eating apple and particularly choice for cooking. Keeps till Thanksgiving or later.

PEERLESS.—Set four years. This variety is of vigorous growth and remarkably free from blight, but judging from its failure to properly ripen its wood and tendency to make a late fall growth, we are inclined to place it as far less hardy than the Wealthy and decidedly inferior to all our best varieties.

The above are the varieties which we have had longest on trial and which we judge to be of greatest interest to the readers of our reports. We have scores of others that are just coming into bearing that will be reported on as their behavior seems to call for notice.

The following are the dates at which each variety ripened its crop in 1894:

Tetofsky, July 29; White Transparent, August 8; Oldenburg, August 12; Charlamof, August 12; Russian Green, August 17; Volga Cross, August 17; Whitney, August 17; Martha Crab, August 24; Wealthy, August 26; Brier Sweet crab, August 26; Hibernal, August 28; Antonovka, September 4; Elgin Beauty, September 4; Longfield, September 7.

WINDOM EXPERIMENT STATION.

DEWAIN COOK, SUPT.

As I made no report of this station's work for the last winter meeting, I shall have to report back a little. The plum crop of '94 was what might be called fair. The Desota, as usual, bore a heavy crop of undersized fruit. The Wolf seems to be my best market plum; it is pretty sure to bear a good crop of large plums that are less injured by the curiculio, or plum gouger, than most other varieties.

The apple crop for '94 was very light. Apple trees do not come into bearing as young in our black prairie soil as they do on the hill soil. At this station we have more alkali, or potash, in the soil than we have any particular use for; it has a tendency to retard the formation of fruit buds on the apple trees and the ripening of the new growth of all fruit trees and plants. The Okabena bore the best of all the apples in '94, taking the age of the tree into consideration. I have something over one hundred varieties of apples growing. I wish to call attention to what I call the Barney apple as an extra long keeping apple. It is a seedling, originating only nine miles from here; fruit, small in size; tree, as hardy as any. I put two of the apples in my cellar last April, and I have one of them yet. The quality of the apple is good.

The past winter was not hard on the fruit trees; in fact, fruit trees never wintered better. The Winsted Pippin was the only variety of apple I noticed that killed back any. Our notes show that something over sixty varieties bloomed the past spring. The Wealthy on our soil proves a shy bearer while young—we have many trees of this variety of bearing size that failed to give us any bloom whatever. Among the newer varieties, we are fruiting this year the Okabena, Daisy, Hotchkiss and Patten's Greening and several varieties of the newer Russians. The apple crop here for '95 will be very small on account of the May frosts. The past not being a test winter, I cannot report much upon the hardiness of various varieties.

With the exception of the tardy bearing of the Wealthy, I am much pleased with the behavior and fruit of the Duchess, Wealthy, Whitney and Minnesota. The following crabs have proved vigorous and free from blight, viz: Martha, Virginia, Pride of Minneapolis and

Compton's No. 3; we have discarded on account of blight the Hyslop, Transcendent, Beeche's Sweet, Lake Winter, St. Anthony Red and Gen. Grant and are holding the Early Strawberry for farther trial, but think it, too, will have to go.

We had quite a number of pear trees bloom, but the frost took all the fruit, and my best trees of these Russian pears are giving out without bearing a specimen fruit. I have about concluded to declare pear growing a failure here.

I had some hopes of the Russian plums but after some ten year's trial of several of the best varieties selected by Prof. Budd, I dont believe they are worth the ground they occupy. In grubbing out the trees this spring, I found them all nearly dead. As they are not hardy, are unproductive and in fruit inferior to our best natives, I believe that we have no use for the Russian plums in Minnesota.

I still have some hopes of the Russian cherries; I had six or seven varieties heavily loaded, but the frost took about all. I have some 723 Oriel that are now ripe.

I have cut down all of the Russian poplars, as none of them were as promising as the cottonwood for this section.

The laurel leaved willow (Salix laurifolia) has developed a species of blight that I am afraid will do damage to other varieties of trees as well. Be careful how you plant it.

Plums will be about one-fourth of a crop. Desota is ahead as to productiveness. I can recommend the Wolf plum, both the clingstone and freestone varieties,as being a most profitable plum, especially for market. Owing to May frosts, small fruits have fared but little, if any, better than the tree fruits. We supposed that the grapes were ruined entirely, but most of them have made a second growth and are now in bloom and with a late fall we may get a few grapes yet. The Worden gave the best satisfaction, followed by the Concord and Moore's Early. Our soil is too black for best results with the grape.

Owing to the dry season of 1894, our new strawberry plantation did not produce as many plants as was desirable, and for the same reason, probably, most varieties are less productive this season than usual, although the plants wintered in good condition. Herein we learn a valuable lesson; we should choose those varieties that *will* form fruit buds in a dry season as well as make plenty of runners, or new plants. The best varieties I have in this respect are the Bederwood and the Crescent, the Bederwood taking the lead, as they attend strictly to business. Warfield comes in third or fourth with the Cumberland at the foot. Capt. Jack is vigorous and productive, but the fruit seems inclined to sunscald. In old beds the bloom was about all killed by frost, while those set the spring of '94 were not in bloom and were not injured so badly, and we are now doing our first picking.

The currant will be from one-third to one-half a crop, Stewart Seedling being very poor;the North Star, Victoria and Red Dutch being a little better; the Long Bunch Holland and White Grape being the best.

In gooseberries, the Houghton is ahead for productiveness.

The dwarf Juneberry, as usual, is bearing a heavy crop, and that in spite of the May frosts. Any one can grow the Juneberry, and birds do not bother them more than other fruit.

I have one hundred seedling Dakota sand cherry bushes, set the spring of '93 on black and heavily manured soil. They are proving a wonder in vigor and productiveness. Like the Juneberry, they have no fungus or insect enemies.

It is not an easy matter to report upon raspberries so that the public will understand the situation. As a rule, all raspberries have been a failure in this section, not only this season but for several seasons past, and, on account of the fungus disease known as anthracnose plants are more healthy on the hill soil than upon our nearly level prairie. Plants that are fully exposed to the winds are most affected, while those growing in sheltered places are affected much less and those in the shade usually none at all. Winter protection does not save a diseased plant. I have done some spraying with Bordeaux mixture with good results, but that is a preventative and not a cure. I have six hills of the Shaffer's that looked last fall as though they were doomed,they were so badly affected. I then cut off the canes of two of the hills near the ground, pruned two more of the hills rather close and left two of the hills untouched. Now, the result is that the two hills cut off at the ground are growing vigorously and there will be a few berries on the new growth; those that were pruned now promise a good crop; those that were left untouched look as though they were about dead, roots and all. No winter protection was given in any case. The Hansel red raspberry is now beginning to ripen and is my first early; the Palmer will begin to ripen in a couple of days, making it my best early blackcap; the canes also excel in vigorous growth and hardiness; the Souhegan is a success as a main crop berry.

The dwarf Rocky Mountain cherry proves to be a variety of our Western Sand cherry. My two plants came from the introducer at Fort Collins, Colorado, the spring of 1893. They bloomed full the past spring but no fruit—too much frost. They are perfectly hardy in the most exposed place, and they bloom a little later than the Dakota or Nebraska sand cherry. The fruit of this cherry will, no doubt, prove variable, as seedlings of it have been introduced instead of plants from the original tree.

EUREKA EXPERIMENT STATION.

C. W. SAMPSON, SUPT.

My grape vines came through the winter in good condition. I took them out of the ground April twentieth, and the buds immediately started and made a healthy growth. The severe frost we had May eighteenth did not hurt them in the least, as they were located on high ground and very near the lake. My first vines bloomed June fifth; variety, Durant Amber. I noticed the leaf hopper was quite bad on the young vines, but the recent hard rains seemed to drive them away. I have one vine of the Telegraph about six feet long which had set eighty bunches of grapes, and I noticed that the grapes fell off from every single cluster. My grapes are all set very full of fruit and promise well for a full crop. Moore's Early are unusually well set to fruit.

MINNESOTA CITY EXPERIMENT STATION.

O. M. LORD, SUPT.

STRAWBERRIES.—The varieties received from the state department are doing well. The Vandeman does not seem to be adapted to sandy land; the Jessie is doing fairly well; also Princess, Warfield, Bederwood, Capt. Jack, Crescent and Downer. The Timbrell is not at home here. The Bubach has heretofore done well but gave no blossoms this year, though the foliage is fine. I am at a loss for the reason. Parker Earle is loaded. On trial, the Princeton Chief, Weston, Arrow, Mary and No. 7, Greenville. The Lovett will be discarded if it continues to stick its nose in the sand.

CHERRIES.—The trees appear to be healthy and are making a fine growth. The young fruit was injured by the frost, and the most of it has fallen off.

PLUMS.—A few varieties are bearing quite well. The Forest Garden and Cheney suffered severely with drouth last year, while some of the contiguous Russians did not suffer. The Rollingstone and Desota are, as usual, full of fruit. No other varieties are bearing heavily.

The gooseberries received last year died with the drouth. Those in bearing are full, viz: Pearl, Red Jacket and the Columbus, the last named being of very large size.

RASPBERRIES.—Palmer, Gregg and Nemaha promise a heavy crop. Of reds the Turner and Cuthbert are very fine. Shaffer was not covered last winter and was badly killed, but will give a partial crop. The Cuthbert, Logan and Columbian are growing finely.

MONTEVIDEO EXPERIMENT STATION.

LYCURGUS R. MOYER, SUPT.

A very dry summer and autumn was succeeded by a very dry and cold winter. Through the coldest weather there was little or no snow on the ground. It was a "test winter." So dry was the season that many of the soft maples (Acer dasycarpum) planted along the streets in Montevideo died. Box elders, too, were greatly injured, and this spring shows many dead and dying branches.

SOME THINGS THAT HAVE FAILED.

Among the many failures on the prairies of western Minnesota we might note: Deutzia gracilis, Lonicera Halleana, Althea, Calycanthus Floridus, Chinanthus Virginica, Spiraea Japonica, Elaeagnus longipes, Lonicera Belgica, Salix Napoleonensis, Ampelopsis Vetchii, Pyrus Japonica, Laburnum, Ligustrum vulgare, Cornus Mas, Cornus sanguinea, Salix laurifolia, Salix acutifolia, Aesculus.

SHEPHERDIA.—The first shrub to bloom on our grounds this spring was the buffalo-berry. It bloomed about the middle of April. Our bushes proved to be all staminate, so we do not look for any fruit. They were evidently made from cuttings from a staminate bush. We have not succeeded in raising the shepherdia from seed. Doubtless, the open prairies of western Minnesota are too dry to make the propagation from seed a success.

The shepherdia argentea is an ornamental shrub of value for planting in situations where it is safe to employ a silvery leaved small tree.

SPIRAEA.—We feel disposed to modify our former unfavorable reports on the spiraeas. No shrub on our grounds has attracted more attention this spring than Van Houtii's spiraea. The plant was for days a mass of white bloom. This spiraea was grown without irrigation. Most of the other species need an artificial supply of water here.

PHILADELPHUS.—There is much confusion in the nomenclature of the different species of Philadelphus as supplied by the average nurserymen. This confusion is added to by careless people who apply the name syringa to the Philadelphus, instead of to the lilac, where it properly belongs.

The common mock orange, Philadelphus coronarius, was the first to bloom with us. It does not seem to be quite so hardy as some of the other kinds. Philadelphus grandiflorus is very satisfactory with us. A closely related variety or, possibly, species is one brought by Prof. Budd from Russia and numbered by him 144 Veronesh. At the present writing it is the most striking shrub on our grounds —a grand mass of beautiful white bloom. A species brought from an Eastern nursery some years ago under the name of Philadelphus cordatus, and which is probably Philadelphus Gordonianus, is about two weeks later than the other species. It suffered some during last winter but is going to bloom freely. By planting these different species one can be well supplied with the flowers of the mock orange for at least four weeks.

PHYSOCARPUS.—Physocarpus opulifolia, or nine bark, formerly included with the spiraeas, is very satisfactory with us. During the flowering season the bush is covered with umbel-like clusters of white flowers, and when the flowers have passed away the reddish fruit pods make it fully as beautiful.

CARAGANA.—The different species and varieties of the pea shrub are very satisfactory with us. They are somewhat slow about getting established,but this year nearly all the species bloomed. Their yellow, drooping flowers in early spring are very attractive.

AMELANCHIER.—The Juneberries are early bloomers and this year they were unusually attractive. They were unaffected by the spring frosts and are bearing a heavy crop of fruit. Lovett's Success is doing the best with us.

MORUS.—The Russian mulberry passed through last winter without very serious injury, but the frosts of May struck it, and it is not producing its usual amount of fruit.

SYRINGA.—The common lilac. Syringa vulgaris is one of the hardiest shrubs ever planted in western Minnesota. There ought to be hedges of it on every farm. Small root sprouts of this lilac set out on the open prairie a year ago, along with box elder, survived the drought and the winter, where even the box elder was completely root-killed. The white variety is fully as hardy. The Persian lilac (Syringa Persica) comes into bloom at an earlier age than the common lilac. It is perfectly hardy and desirable. Syringa Josikaea is doing well here, but has not yet bloomed. A variety of the common

lilac, brought by Prof. Budd from Russia, and the variety Chas. XII are both doing well. The Japanese tree lilac, Syringa Japonica, seems to be hardy.

ELÆAGNUS.—The silver berry of the farWest is not doing very well with us. Perhaps our bluff-side station is too dry for it. The Russian olive, Elæagnus hortensis songorica, is one of our most promising shrubs. Landscape architects need not hesitate to plant it wherever a small sized silvery-foliaged tree is desirable.

PRUNUS.—Prunus padus of Europe resembles the choke-cherry but is not so upright in its growth. It blooms freely and is now loaded with fruit. The Russian plums, Long Red and Long Blue and the Bessarabian cherry are looking well but have not yet fruited. Prunus pumila, the sand cherry, bloomed freely, but the May frosts destroyed the fruit. The Ostheim and Suda Hardy cherries are quite promising. The little Morellos have nearly a'l succumbed to the drought.

SAMBUCUS.—The native red-berried elder,Sambucus racemosa,is an ornamental shrub of merit and does well here. The golden-leaved form of the European sambucus nigra is now in bloom here and is quite attractive. Although not quite hardy, it starts vigorously every year and possesses some merit. The cut-leaved variety seems to be more tender.

GYMNOCLADUS.—The locust does not seem to be a success here, but its near relative, the Kentucky coffee tree, continues to do well. It is a very attractive tree.

CONIFERS.—The dry and cold winter took away our single large Norway spruce and seriously disabled our black spruce. The white spruce still survive, but they bear the marks of battle. The Colorado blue spruce were severely browned but have all started vigorously again. The balsam fir trees lost their leaders and are seriously crippled. A large, well established, native juniper died outright, but it stood near a row of cottonwoods. The Scotch pine is healthy and vigorous. Our Pinus ponderosa is not old enough to report on but looks well. The Mugho pine (P. Montana) continues to do well.

ROSES.—The old fashioned Scotch and blush roses do well with us without winter protection. The yellow Scotch rose is very satisfactory, too. Most of the moss roses do well with some winter protection. One of the most satisfactory roses we have is Seven Sisters. It is classed as a climber, but we have no trouble in taking it down and covering it winters. Rosa rugosa is very hardy, and Rosa Wicheriana promises well.

LA CRESCENT EXPERIMENT STATION.

J. S. HARRIS, SUPT.

Our report at this time is necessarily very brief. As is well known, the drouth of 1894 was so intense that trees of all kinds made a much lighter growth than usual, and many varieties failed to develop their fruit buds, and the late autumn rains, although not sufficient to insure the perfect safety of the trees, caused a starting of the buds and a late flow of sap. Raspberries and blackberries were affected in the same manner, while strawberries suffered still

more, plants continuing to die out during the entire summer, and few new plants were formed until late fall, and such did not become strongly rooted. Fortunately, the winter was not exceptionally cold, and the damage not as great as generally feared. Orchard trees generally came through without apparent injury but did not bloom nearly as full as in 1894. Nursery stock suffered considerably from root-killing of one and two-year old trees, and the supposed hardier varieties, as Oldenburg and Patten's Greening, much worse than the more tender varieties. The roots of blackcap raspberries and blackberries were considerably weakened and are not throwing up the usually strong canes for next year's fruiting.

FRUIT CROP AND PROSPECTS.—The strawberry crop has been very light, not exceeding one-fourth of an average, and beds two or more years old have borne better than the plantations made last year. Quite severe frosts occurred on several mornings after plants had bloomed and set fruit, which, owing to lack of vigor in plants, wrought great injury. The Bederwood and Crescent were injured worse than other varieties; on the Bederwood the foilage suffered greatly and the pollen was rendered abortive for fertilizing pistillate varieties. The varieties suffering the least were Warfield, Michel, Parker Earle and Haverland. Raspberries gave promise of an abundant crop, which was lowered fully one-half by the frost. With favorable conditions blackberries may give nearly our average crop. Grapes suffered fully as bad as the strawberry, but favorable weather following has brought out a new growth of canes and a promise of nearly a half crop if fall frosts do not occur too early.

The apple crop promises to run from about one-fourth to one-half of a full crop. Cherries, currants and gooseberries are all carrying a fair crop. The show for native plums is better than at first expected. The Cheney and Rollingstone being better than Desota, Hawkeye, Forest Garden and many others.

No reports can be made of the varieties of small fruits added to the list last season. The Royal Church raspberry lived but did not make a very strong growth. They did not receive any injury from the winter and are carrying a little fruit. Of older varieties, the Shaffer appears to have been injured the worst, and the plantations of all kinds set in 1894 worse than those that were a year older, except where poor or no cultivation was given.

ADDITIONS MADE THIS SEASON.—One hundred and forty-eight apple trees were planted in the experimental orchard; 35 of the varieties are such as we have not before put on trial, and about a dozen of them are seedlings not on trial in any other station. We have found the Red Queen (Russian) more tender than the Wealthy and about as subject to blight as the Transcendent crab and not worthy of further cultivation; also a few seedlings that have not received names or descriptions will be dropped from further trial. About twenty additional varieties have been added to the nursery. No new varieties of strawberries except the Herbst and Sparta have been planted for testing. The Columbian, Loudon and Logan raspberries have been furnished us by Prof. Green, of the state station.

SAUK RAPIDS EXPERIMENT STATION.

MRS. JENNIE STAGER, SUPT.

This spring I received from the experiment station at St. Anthony Park one dozen Russian apple trees, two each of Silby's Nos. 5 and 99, Duchess, Greenwood, Patten's Greening and Tonka; of plums, one each of Forest Garden, Lyman and two each of Homestead, Rockford, Desota, Weaver and Rollingstone; of raspberries, one dozen each of Ohio and Nemaha; of shrubs, berberry, thunbergia, golden spirea, spirea prunifolia, spirea Van Houttii and upright honeysuckle; of ornamental trees, one each of golden cottonwood, laurel willow and golden willow and quite a number of seedlings; Scotch pine and white pine; of grapes, one Amina, three Herbert and two each of Winchell, Brighton and Ohio besides a basket of greenhouse stock. With the exception of one white pine, all have lived and have made an exceptional growth, owing to the frequent rains we have had this spring.

In the north part of the village most of the currants and fruits are killed, while at this place owing to the many trees around, especially a windbreak at the north, we shall have a medium crop of currants, gooseberries and grapes. We thought at first we should have neither apples nor plums, but right in the same orchard where half of the trees have not a plum left on them from the frost others hang so full we have been obliged to remove some. Also the Russian apples that we thought ruined, as the petals turned black with frost, hang full of apples; so it appears the frost did not harm the heart of the bud. From my experience with apples up north here, I think the Russians are the only ones we can successfully raise, and only the hardiest of those. I also think we can raise some of the Russian cherries, as I have some of them in fruit. The red raspberry crop is a complete failure, but black raspberry plants that were taken up late have the promise of a fair crop. While my strawberry beds are nearly ruined owing to the drouth of last year, at the Reformatory and other places where there was an abundance of water, the yield will be enormous.

One thing I noticed about the frost of the twelfth (the severest of four we had in succession), it seemed to go in waves. While potatoes, peas and everything was cut down in one place, two hundred feet away a bed of gladioli, a foot high, and other flowers, some quite tender, entirely escaped. Also, one neighbor had everything on the place frozen, and just across the street not a plant was touched.

WHITEWASHING WITH THE SPRAYING PUMP.—The use of Bordeaux mixture in the spraying pump suggests that the machine can be used to good purpose in spraying whitewash upon greenhouse roofs, barn basements and fences. We now apply all the whitewash upon our large glass roofs by means of a pump and nozzle. The whitewash is made in the ordinary manner, of lime and water, and is diluted to about the consistency of thin cream. If a large surface is to be covered, especially if it is difficult to reach, a direct delivery nozzle, like the Boss, or a common discharge nozzle, is used, and the operator stands several feet away. But if it is desired to cover the surface evenly and neatly, the McGowen nozzle is most satisfactory.—*Canadian Horticulturist.*

Biography.

WILLIAM SOMERVILLE, VIOLA, MINN.

(SEE FRONTISPIECE)

The subject of this sketch was born in Beaver county, Pa., in the year 1819. He came with his parents to Ripley county, Ind., at sixteen years of age, where he worked at the carpenter's trade for a period of five years. He then bought forty acres of land in the timber and began clearing a farm, adding thereto from time to time until he became the owner of 200 acres. His wife's health becoming impaired, and a change of climate being deemed desirable and to her advantage, he sold his farm and removed to Olmstead county, Minnesota, in the spring of 1860, purchasing two claims, partly of smooth prairie and partly of grub land. In the spring branch lay twenty apple trees that had been purchased the preceding fall from Mr. A. W. Sias, who was then canvassing in that part of the country for a New York nursery. He grubbed out the hazel brush and set the trees, the varieties being Talmon Sweet, Golden Russet, Wine Sap and one Duchess of Oldenburg. (The last mentioned tree is still alive and in bearing condition.) Being resolved to grow fruit, if possible, he prepared the ground and in 1862 gave Mr. Sias an order for two hundred more trees, including fifty of the Duchess. The latter were set in his orchard in the form of a square,where they still stand in a healthy and thrifty condition. The other varieties have long since disappeared.

In the winter of 1872-3, he was a member of the state legislature. In the years 1874 and 1875, he was employed by the Hon. L.B. Hodges as foreman to set trees along the line of the St. Paul & Pacific Railroad, at Willmar, Benson, Morris and other towns along that line.

Having experimented with Eastern fruit trees and become discouraged with the results, in 1877 he started a small nursery of apple trees and evergreens. Scions were obtained from seedling fruit trees which had withstood previous trying winters, and a small supply was also received from the Agricultural Department. In 1880 an orchard of some 200 trees was set, including a number of Russian varieties. These trees all grew well, but the seedlings were mostly killed by the trying winter of 1883-4. A few trees in the orchard and nursery escaped where well protected on the north by a willow hedge, but the Russian varieties withstood the test, and these still remain in a fruitful condition. Encouraged by this experience, he added thereafter some hundred or more Russian varieties and a limited number of the better varieties of seedlings, and he now has some 2,000 trees. This experimental work he has conducted independent of outside aid, seeking to obtain a few of the best varieties for hardiness of wood and fine quality of fruit, which farmers can set with some degree of certainty.

Mr. Somerville was on the staff of the Minnesota Farmers' Institute, as lecturer on horticulture, for some three years. He exhibited fruit at the first state fair held at Rochester. He was one of the first or charter members of the Minnesota State Horticultural Society with J. S. Harris, A. W. Sias and others, and was afterwards made an honorary life member of that society.

July Calendar.

J. S. HARRIS.

(The calendar for June was duly prepared by Mr. Harris, but at the last was necessarily omitted. Sec'y.)

ORCHARD AND NURSERY.—Overbearing is injurious to many varieties of apples and plums. Any trees that have set more fruit than they can carry to maturity must be relieved, or their vitality will be so lowered that they will perish, or become greatly injured in a following hard winter. Such trees should be relieved by thinning the fruit early this month. Removing one-half or more of the fruit may save the life and usefulness of the tree and does not materially lessen the bulk of the crop at maturity but improves the quality and value.

The earliest summer apples begin to ripen in this month; none of them should be allowed to go to waste, and windfalls should not be allowed to lie upon the ground to afford breeding or feeding places for bacteria and insects. Wormy apples should be picked off whenever seen and, together with the windfalls, fed to the hogs or otherwise destroyed.

Necessary pruning may be continued through most of this month. The head of a tree should be kept open enough to admit air and sunshine to the interior. No ironclad rules can be applied to the operation, but some definite object should be kept in view. Care should be taken that too much foliage is not removed at one time and that the trunks and larger limbs will not be exposed to the midday sun, or sunscald may follow.

Trees in the nursery should be looked after frequently and prevented from forming one-sided heads, and where branches start that would form sharp forks, one should be removed at once. Grafts will need to be looked to frequently. They must not be interfered with by surrounding branches, some of which may need to be cut away, and such as are growing too rapidly or spindling up are benefited by pinching out the point, or terminal bud. Good nursery trees cannot be raised in with grass and weeds, hence frequent cultivation should always be given.

INSECTS.—Any nests of tent caterpillars that have been overlooked should be destroyed at once. There are two or more broods of the codling moths each year, the brood that does the greatest damage trying to get in its work during this month. No matter how thoroughly the trees have been sprayed, some of the larvae of the early brood have escaped destruction and matured in the young fruit. When the worm leaves the fruit to undergo its last transformation to a moth, it seeks some place of concealment. Placing bands of hay, cloth or paper about the trunks of trees affords them a favorite place, and by taking off the bands once a week and killing the worms and chrysalides found, much of the later damage will be prevented. Young orchards should be kept well cultivated, and in older orchards, grass and weeds should be mowed frequently, and not taken off but allowed to remain upon the ground as a mulch.

STRAWBERRIES.—For this year the strawberry season is generally over. Taking but one crop from a plantation is strongly advocated, and then turning under; but we believe it more profiitable to run the bed two seasons. To prepare a bed for carrying over as soon as the last picking is made remove the coarse mulching, mow, rake off and burn the old vines and dress the beds with old manure and ashes or tankage; then plow and harrow the alleys between, narrowing the rows down to ten inches or one foot, and keep all weeds out. If the season is favorable, the spaces plowed up will fill with new plants from the runners by fall, and the old ones may be dug out; if not, they will widen out the rows which may be retained for bearing, leaving the alleys the same as the previous year.

The cultivation of new beds must not be neglected, as plants that have been starved in a thicket of weeds will never fully recover. It pays to spend a little time in directing the runners and pegging them down where plants are wanted and encouraging them to make plants early. Where plants have failed to grow, the vacancies should be filled in with some of the strongest plants as soon as well rooted, taking them up with trowel or spade without disturbing the roots.

RASPBERRIES.—Raspberries should be picked as fast as they ripen, and no cultivating must be done while the picking season lasts. Always use clean new boxes for the berries that are to be sent to market. Good fruit and attractive packages make a profitable combination.

CURRANTS.—The fruit of currants is best gathered as soon as ripe to prevent loss from birds and insects. The currant worm is two-brooded, the second brood feeding upon the foliage quite late. After all the fruit has been gathered, a thorough spraying of the bushes with the Paris green solution will destroy them more completely than any other remedy. Shoots that have borers in them should be cut out and burned.

BLACKBERRIES.—The young canes for next year's fruiting should be cut back to the height of two to three feet early in this month, and the surplus shoots are to be treated as useless weeds. If the plantation has been well cared for, go through it once more with a horse and cultivator, leaving the ground between the rows level, and apply a liberal mulching of green clover or clean straw, and no other working will be needed until after the fruit is gathered.

GRAPES.—In the vineyard tie up the fruiting canes as needed, and discontinue the pinching in of laterals early in the month; also, remove surplus shoots early and be careful not to let young vines carry too much fruit by removing a portion of the clusters before they begin to draw too heavily on the plant. If any rot or mildew appears, give another spraying with the Bordeaux mixture or the copper carbonate solution.

Those who intend to exhibit fruit at fairs should make early selections of specimens and protect them against birds and insects and also encourage them to the most perfect development.

VEGETABLES.—In the vegetable garden, hoeing and cultivating should be continued to encourage a vigorous growth and keep down weeds. Asparagus plants are now storing up energy for next year and should be kept in vigorous growth. They may be greatly helped by the application of liquid manure. Beans, beets, carrots, cucumbers, early sweet corn, radishes and turnips for late use may be planted from first to middle of the month; also cabbage and cauliflower may still be set for late use. For this climate it is best to get out the celery early in the month. Newly set plants should be shaded for a few days until the roots have taken a hold upon the soil.

Secretary's Corner.

At the last meeting of the executive committee several matters of interest to the members were transacted, to which your attention is here called:

RESIGNATION OF TREASURER DAY.—Mr. Ditus Day, who has so long and faithfully filled the office of treasurer of this society, has seen fit to tender his resignation. We all regret very much parting with Mr. Day in his official capacity, as this relation has always proved an agreeable one. The vacancy was filled by the board by the appointment of Mr. F. G. Gould, of Excelsior, to serve the remainder of the year.

A NEW EXPERIMENT STATION.—An experiment station has been located at the residence of Mr. Wm. Somerville, Viola, Minn. A number of the experiment stations of the state are located in positions not very favorable to pomology, and the success in Mr. Somerville's locality would indicate the probability that this place is especially well adapted to successful fruit growing, and we all know that Mr. Somerville combines in himself the qualities needed to make a successful fruit grower. We hope for very interesting reports from this new station.

BACK NUMBERS OF THE "HORTICULTURIST."—There are several hundred copies of last year's HORTICULTURIST still remaining in this office, and there are a hundred or two also of each month of this year's numbers to spare. The secretary will be very glad to send these surplus numbers in any quantity, from one to a hundred, to any address as sample copies, without expense to the receiver. Could you use any in your neighborhood, either by distribution among your friends or at some gathering, or are there parties somewhere in the country to whom you would like to have copies sent? Please assist me in placing these in good hands where salutary results may follow.

SUPERINTENDENTS OF EXPERIMENT STATIONS.—The executive committee decided that, in recognition of the gratuitous services of the superintendents of the experiment stations and to insure their very helpful attendance at the annual meetings, hereafter the traveling expenses of the superintendents of unpaid stations should be returned to them, provided they made full detailed reports of everything of interest to our society growing at their respective stations. The interest of our meetings is much increased by the presence of these practical investigators, and, as their work is entirely gratuitous, the only thing in the way of compensation being the small amount of experimental stock sent them from the central station, this is no more than a proper recognition of the obligation of the society to them. We hope hereafter to have a full attendance of the superintendents.

LIBRARY.—The contemplated list of additions to the library will have to be put off until another number, being crowded out by the many important papers appearing in this July number. The list is steadily growing.

MIDSUMMER EXPERIMENT STATION REPORTS.—Do not fail to read very carefully the reports contained in this number. They are the kernel with the shell cracked and taken off, and are really the most important papers that come into our hands. The advantage of their seasonable publication must be apparent to all.

SECRETARY PHILIPS, OF WISCONSIN.—It was a pleasure to meet at our summer meeting, Sec. A. J. Philips, of the Wisconsin society, who came directly from their summer meeting of the day before. He has kindly furnished HORTICULTURIST a report of their meeting, with a few of their papers, which are printed in this number. The reports of the two meetings both appear in this issue, which is a happy arrangement for us. We get in this way the benefit of the practical common sense of our Wisconsin neighbors. Their society is growing in numbers and also very much in interest, thanks to the push of the secretary and other workers in their association.

WHERE WERE THEY?—Some of the familiar faces at our gatherings were missing at the late summer meeting. Prof. W. M. Hays, always a regular attendant, was away locating a new experiment station; Prof. Lugger was doing a good work planning a raid on the grasshoppers in the country. Amongst others who are usually present but were detained elsewhere were Professors Brewster and Pennell. Prof. Green himself came pretty nearly not being there, so near that he started for Boston late in the afternoon of that day and was not present at the meeting of the executive board held at the close of the session. He has well earned a vacation and, we hope, will enjoy it to its full.

COMMUNICATION.—"The fruit trees blossomed very heavy this spring, but since the late frosts the young apples have dropped so badly that I think we will not have more than half a crop of Duchess or Wealthy and there are few Transcendents in our orchard or hereabouts. From most of the apple trees in this vicinity the crop will be very light."

C. L. BLAIR.

St. Charles, June 25, 1895.

Judging by the correspondence of this office' the above is a very fair statement of the condition of the apple crop in the state. Not over half a crop is to be expected and in some places cut down below that. If Mr. Wedge's suggestion is true, that the tree exhausts itself in the act of blossoming, this does not necessarily increase the probability of a large crop next year from trees of which this is the bearing year. How is this? And let us hear from the fruit crop prospects in your locality. SEC'Y.

SAVE FRUIT FOR THE NEXT ANNUAL MEETING.—The Executive Board has authorized the secretary to arrange with the fruit growers of the state to send their fruit here to Minneapolis to be placed in cold storage and kept for that occasion. The express charges on such fruit and also the cold storage charges will be paid by the society, and the exhibitor will be entitled, as well, to any premiums he may secure by reason of the exhibit.

We want to make a show of several hundred plates at our next meeting. If you wish to aid in this endeavor, please correspond with the secretary at an early date, stating what varieties you can probably furnish, and shipping tags, etc., will be sent you.

N. B. The society is not to be responsible for any charges except where previous arrangements have been made through correspondence with the secretary.

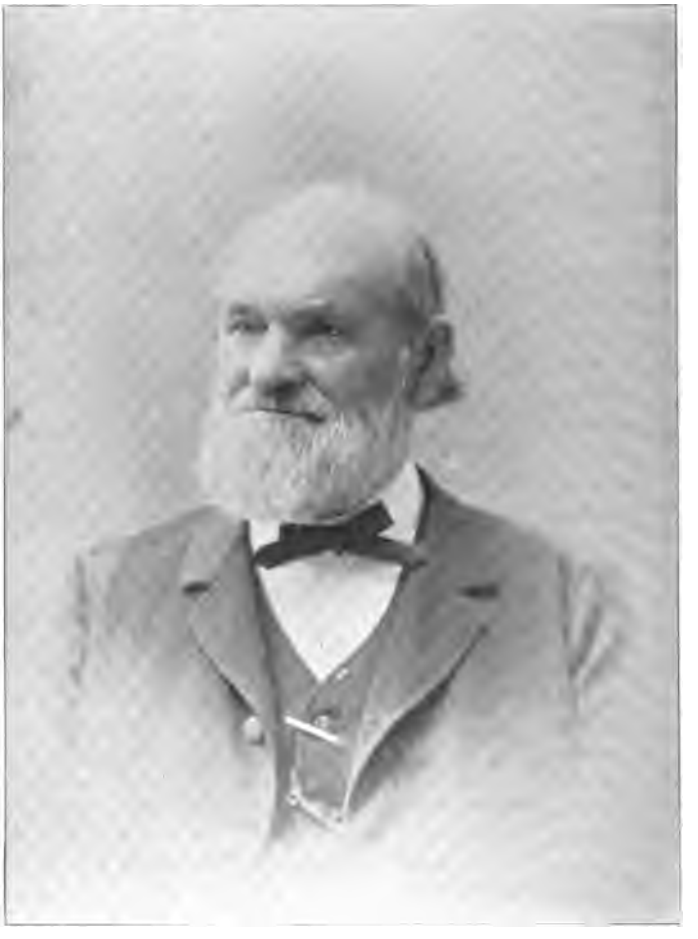
Only five or six specimens of a kind are needed for an exhibit. Wrap each specimen carefully in paper, without bruises, and put all of one kind in a paper bag by themselves, properly labeled. To insure their keeping well, the fruit should be gathered while still *very firm and solid.*

Please make the list as large as possible in number of varieties. Send as many varieties at once as possible to save express charges, as it will hardly pay to pay the charges on one or two varieties at a time. A premium list will be announced later. How many will help us in making a great show this winter?

The annual meeting, you know, is changed to the first Tuesday in December.—Sec'y.

TREES NEED SLEEP.—In the larger cities, where shade trees are few and scattering, electric lights seem to have no visible effect upon their foliage. In the towns and villages, however, many of which have their electric light systems, the effect is very noticeable, the leaves appearing as though they had been subjected to the blighting breath of a harmattan. The question was recently discussed at a meeting of the Eastern aboriculturists, the conclusion being that the trees need darkness in order that they may sleep, and that being continually kept awake and active they have been worn out and made prematurely old by the action of the light. That this is probably the correct solution of the mystery of the drooping leaves may be judged from the fact that similar trees in the neighborhood of those affected (although not exposed to the illumination) still retain their color and seem bright and strong.

SHE HAS DONE WELL.—California has a woman horticulturist who has made a record of which she may well be proud. She is the widow of Henry Barrolgoit, once a wealthy banker. His bank failed, he gave up all his property, and died soon after. His widow then undertook to make a living by raising flowers for the San Francisco market. She succeeded so well that she now owns 140 acres of land, all under cultivation. Seven acres are in chrysanthemums; twenty acres are devoted to violets. She personally attends to every detail of the business, and her success demonstrates what a plucky and intelligent woman can do when thrown on her own resources.—*Amateur Gardening.*



E. H. S. Dartt

OWATONNA, MINN.

Taken in 1895, aged 70 years.

(See biography, page opposite.)

THE MINNESOTA
HORTICULTURIST.

VOL. 23 AUGUST, 1895. NO. 7.

Biography.

E. H. S. DARTT, OWATONNA, MINN.

(SEE FRONTISPIECE.)

E. H. S. Dartt was born in Salisbury, Addison county, Vermont, Nov. 24, 1824, making his present age seventy years. His ancestors were English, and Eliphalet, Joshua and John seem to have settled in Connecticut about the year 1700. His great grandfather, Joshua, removed from Boulton, Ct., to Surrey, N. H., before the revolution, and his many sons were active participants in the struggle for independance. His grandfather, Josiah Dartt, and his father, Josiah Dartt, were early settlers at Weathersfield, Vt.

In July, 1844, the subject of our sketch made the trip alone from Goshen, Vt., to Dodge Co., Wis., being eighteen days on the road. Wisconsin was the frontier then, and he accepted with keen relish the novelty and the vicissitudes of pioneer life. Two years later he settled at Kingston, Wis., where he married and remained till 1868, when, with a view of securing better school advantages for his children, he visited all the leading towns of Minnesota, having previously visited Kansas, and finally settled at Owatonna.

During his residence in Owatonna, he has been closely identified with all the improvements, and especially in the planting of trees, which go so far in beautifying a city. He served two terms, six years, as a member of the board of education, at one time being its president. In politics he is a staunch prohibitionist.

When a boy in Vermont he learned to graft apple trees and has always since had a strong inclination to engage in horticultural pursuits. In Wisconsin he became a member of the State Horticultural Society in its infancy, and his orchard there contained more than 1,000 well cared for trees. He arrived in Minnesota in time to become a charter member of the Minnesota Horticultural Society, and his orchard here at one time contained over 5,000 trees, though now reduced to about 3,500.

After the School for Indigent Children had been located at Owatonna, he conceived the thought of an experiment tree station on its grounds. The state horticultural society recommended it, and the

legislature provided for it by law, and Mr. Dartt received the appointment as superintendent. To this interesting charge then Mr. Dartt is now largely devoting his time and developing a work altogether congenial to him. We believe this, his latest work, will prove to be a fitting and lasting monument to the labors of a life given to horticulture.

Mr. Dartt has held many offices of importance in connection with this society, notably that of vice-president from his district, which he has occupied for sixteen years and fills at this date.

His has been an eminently practical life, and in the society he has always been looked upon as a working member, one of those, if there was anything to be done, whose assistance could be counted upon.

Though his three score years and ten are already past, his temperate and wholesome life gives assurance that he will be with us many years yet to encourage by his counsel and cheer and enliven by his ever ready and pleasant wit.

May life's richest and crowning blessings fall upon the gray heads of those who gather with us.—SECY.

OWATONNA EXPERIMENT STATION.

MIDSUMMER REPORT.

E. H. S. DARTT, SUPT.

I send a brief approximate statement of the amount and condition of the stock now growing at the Owatonna tree station. I estimate the whole number of trees at 15,000, about 12,000 being apple and crab trees and the remainder being largely evergreen, shade and ornamental trees. There are about 800 varieties of apples that have been grafted, besides a large number of seedlings. A majority of the seedlings are of crab origin, being grown largely from Minnesota, Quaker Beauty and other crab seeds. These crabs were grown in close proximity to Duchess, Wealthy, Tetofsky and other apples, so that valuable crosses are likely to develop.

As it was not expected that I would raise trees to sell, I intended to graft just enough of each kind for a fair trial, increasing the number somewhat on best known varieties. In grafting 6,500 last winter, about 1,000 Duchess and 1,000 Hibernal with 50 to 100 of several other leading sorts were grafted with a view to supplying the local demand. Most trees are in fine condition, and especially the root grafts above mentioned. In the orchard many varieties blossomed, but the fruit was mostly destroyed by frost. A few apples remain of about thirty-five varieties—the Duchess showing most fruit. Blight has touched but lightly up to the present time.

Plums in the orchard are doing fairly well in growth, and most of the trees are producing fruit, but there is not likely to be more than a quarter of a crop on account of injury by frost and worms. Of a

lot of plum trees grown from nuts from plums of large size and good quality, about forty are bearing, and a few of them are likely to be of some value.

One cherry tree, which I call Budd's Autograph, is moderately well loaded with fruit of small size and apparently poor quality; some others are looking well and some poorly.

Russian pears are not doing very well, but the Longworth is making a very rapid growth and seems as hardy as a crab, but is liable —and, I might say, likely—to be knocked out by our next hard winter.

The dwarf Juneberry is bearing heavily every year, but the fruit is all gobbled up by the birds.

We are trying one experiment from which we have reason to expect very favorable results: we are girdling fruit trees with a view to bringing them into early bearing. We have noticed that trees that have received serious injury often blossom profusely, and we may infer that checking the flow of sap tends to fruitfulness. A limb of an apple tree of considerable size was girdled last year, and this year it was full of blossoms, with not another blossom on the tree. The girdling of a limb by the label wire produced the same result, and a limb on a small orchard tree also girdled by the label wire has several apples on it at the present time. With these facts in sight, we have girdled quite extensively this season.

It is the present plan to leave trees enough for an orchard on all ground covered with nursery trees, and,there now being many times more trees than can remain permanently, girdling may be practiced in a reckless way, as, if half the trees are killed, no harm will result. On very rapidly growing trees,it is likely that the girdling will need to be repeated every year or two, whilst,with slow growing or tender varieties, it may be risky to girdle at all. A Duchess tree girdled this year will likely bear heavily next year; the year after, or the second year after, the wound may be completely healed over, and the effects of the girdling be gone. Who knows that we may not by this girdling process not only hurry up tardy bearers, but by studying up the nature of different varieties, we may regulate to some extent the annual production. Wonderful are nature's laws and hard to understand. The *best* time to girdle is not yet known, but I regard May and June as perfectly safe, and the range is probably much wider. My method is to remove a ring of bark, one-eighth to one-quarter of an inch wide below the limb. I have placed wires tightly about some trees which are expected to do the girdling next year. I have also used a saw, running around the tree spirally, without completing the circle. This seems to be the most expeditious and practical, produces the same effect and can be readily worked on large trees as well as small.

I notice that trees girdled the first of May have thrown out sprouts profusely and have not increased in size below the girdle, while there are no sprouts and the tree is much enlarged just above the girdle. This seems to prove the theory that elements of growth come almost entirely from the atmosphere, moisture only coming from the soil.

HOW THE BADGERS GROW FRUIT.

F. G. GOULD, EXCELSIOR.

In the early spring Mr. Chas A. Sampson, of Eureka, and I decided to go into Wisconsin to inspect the methods of the fruit growers there and see how they handle their business and also to examine any new sorts of especial merit, the much praised Loudon raspberry being the principal one, which we desired to inspect in the fruiting season. We met Mr. A. J. Philips, secretary of the Wisconsin State Horticultural Society, at the summer meeting of our society and informed him of our intention to visit some of the fruit growers in his state, also of our desire to see the Loudon raspberry at the most favorable season. A few days before the Fourth of July, Mr. Philips notified us that the twelfth was the date decided upon as the most favorable to inspect this plant in fruit. We found Mr. Philips at his home in West Salem, Wis. Mr. J. S. Harris was there, having preceded us by one train.

Mr. Philips was around early in the morning, to take the party out to his farm and orchard six miles north of town. Our way lay through well-tilled farms. Large fields of grain, and grain of magnificent growth, bordered our way. The last mile was a continuous ascending grade,averaging six feet to the hundred. On the summit, which is comparatively level, is located Mr. Philips' farm of 300 acres, near the center of which is his fifteen acre apple orchard.

A portion of this orchard is planted along the borders of the farm roads, where it has a perfect exposure to sun and air. The elevation above the surrounding country is 300 feet, more or less. Most of the trees in this orchard have been topworked, budded or grafted, on the Virginia crab. The larger trees, including Wealthy, McMahon White and many other sorts are carrying a heavy crop of fruit. These trees, excepting the Whitney and the Oldenburg, draw their sustenance up through four to six feet of Virginia crab stock, or trunk. Mr. Philips believes this crab stock tends to earlier and greater productiveness and also imparts a more robust habit to less hardy sorts. This orchard is carrying a splendid crop of apples.

This topworking of the apple is fairly well tested here, and result is convincing that it is a valuable improvement upon the common methods.

We next visited the Thayer fruit farm at Sparta, where our party were nicely entertained by the Messrs. Tobey and Herbst. I must not omit the ladies, Mrs. Thayer and Mrs. Tobey, who participate in the management of this, the largest and best equipped small fruit farm in the Northwest.

We devoted one-half day to the inspection of the various fruits and other things of interest. Strawberries are planted by a machine at the rate of four acres per day and about 6,000 plants to the acre. The principal fruits grown are strawberries, raspberries, blackberries and gooseberries. The drought of last year, together with the absence of the snow protection, left the plants at the beginning of this season in a weak condition, and the fruit crop this year is comparatively light.

The new seedling gooseberry, Queen, is a healthy looking plant, and its fruit is extra large and clean. I hope it will retain its characteristics when tested in remote localities. The Loudon raspberry is bearing fruit here and we had an opportunity to pass upon its merits, the fruit having been left on in anticipation of our visit. I was well pleased with the looks of the plant and better pleased with the fruit, which I will describe as of the color of the Turner, a lively true scarlet, and conical in form. It is firm in texture, the size of the Cuthbert or slightly less. The flavor to my taste is a suggestion of the Turner, but slightly inferior to that standard of exquisite flavor in the red raspberry tribe.

Considering also its productiveness and apparent hardiness, I believe this new raspberry marks another mile-post in advance of all the well known sorts.

POINTERS FROM THE SEEDLING FRUIT COMMITTEE.

J. S. HARRIS, CHAIRMAN.

A. J. Philips' Orchard, West Salem, Wis., Thayer's Fruit Farms. Sparta, Wis., Louden's New Seedling Raspberry, Janesville, Wis., etc.

On the morning of July 11th, in company with Messrs. F. G. Gould and Chas. A. Sampson, of Excelsior, we visited the orchards of A. J. Philips, which are situated on the top of a bluff about six miles north of West Salem, Wis. The elevation where the orchards stand is from four hundred to five hundred feet above the bed of the Mississippi and La Crosse rivers and has good air and water drainage in all directions. It occupies some twenty to thirty acres of ground. The leading varieties grown for market purposes are the Duchess of Oldenburg, Tetofsky, Wealthy, McMahon White and Whitney No. 20, but trees of fifty or more other varieties are growing in greater or less numbers and generally doing well.

Mr. Philips is paying considerable attention to topworking some of the nearly hardy varieties upon the Virginia crab as a stock, and is meeting with gratifying success. The Utter,or Cooper, upon this stock so far a grand success; it makes a good union, is very productive and free from blight. The Wealthy, Wolf River, Grimes' Golden, Tetofsky, Haas, Northwestern Greening and several others are also doing better than upon their own roots and trunks, besides coming into bearing much earlier. The Malinda is fruiting on the third year after grafting, a saving of about twelve years' time over root grafts of this variety. The original tree of the Avista apple is in this orchard and is now bearing its twenty-eighth crop (about twelve bushels) and looks sound and hearty enough to produce good crops for many years to come. In portions of the orchard trees are somewhat scattered from tender varieties having been killed out, and in all such cases the remaining trees are more robust and are producing larger and better crops, besides suffering less from blight, an object lesson that shows the fallacy of too close planting. In this orchard the Whitney No. 20 is used as border trees and fence posts, and is proving one of the most valuable sorts in the collection.

The afternoon of this day we spent in looking over the Thayer fruit farms and other fruit plantations at and around Sparta, Wis., now famous for its more than 500 acres of small fruits, 100 of which are on the Thayer farm itself. This farm is managed on business principles and has proved a success from the beginning, but we do not believe in monoplies in the fruit or any other business. It affords employment and helps out the living of a great number of people and can, probably, produce and handle the fruit cheaper than smaller firms, but it also tends to discourage men and women with small capital from engaging in the business, which in the end is against the large class of consumers. We favor growing the fruit by individuals according to their ability and facilities for doing it well and having a system of co-operation in the marketing of it. Owing to the extreme droughts of '94, the plants did not make the usual growth or go into winter in the average condition, which combined with the severe frosts that occurred in May of this year has very much shortened the present crop, and some varieties are nearly a failure. However, currants and gooseberries have been an exceptionally fine crop. Everything is being given the most thorough cultivation. The season's growth of plants is healthy,and the prospect for next year's crop is very encouraging.

Some of the promising things seen here are the Sparta and Herbst No. 2 strawberries. The Columbian and Loudon raspberries, and the new Queen and Red Jacket gooseberries are on trial and all promising. Visitors to this place receive the most cordial treatment and are shown everything of interest and are concisely told how everything is done, and, if at all apt scholars, are well paid for their visit.

After viewing a few smaller plantations and seeing irrigation in practice on the two acre plantation of Mr. Wolcott, Mr. Philips, Mr. Sampson and myself took a night ride to Janesville, Wis. Early on the morning of the twelfth we were joined by L. J. Kellogg, of Ripon, Geo. J. Kellogg, Janesville, and Messrs. Coe and Converse, of Fort Atkinson, who are members of a special committee of the Wisconsin Horticultural Society, and at once proceeded to the fruit farm of F. W. Loudon to see, examine, taste and learn all we could about the Loudon raspberry. It is without doubt the most wonderful raspberry of its class (Rubus strigosus) that has been produced since the improvement of this valuable fruit began. It originated with Mr. Loudon (and bears his name) from seed of the Turner raspberry pollenized by the Cuthbert, and presents all of the good points of both parents, and some that neither of them have, in a marked degree. The seed was planted in 1880, and the original plant first fruited in 1881. The plants are strong,vigorous and healthy, with an abundance of fibrous roots that enable them to endure droughts well and continue in bearing longer than the average season. It does not produce suckers as freely as most of the red varieties. The canes are shorter jointed and more stocky than the Cuthbert, and it appears to be more hardy, having endured several winters without protection and come through without injury when the mercury dropped to 26° and 30° below zero. The drouth

about Janesville this season has been intense, but a three-fourths acre plantation of this variety in its second year of fruiting is a sight not soon to be forgotten. The canes were literally loaded to their fullest and bending to the ground under the weight of the fruit. The fruit is very large and of an attractive red color that does not fade. The flavor is the finest of all raspberries, the fruit not dry and seedy, but possessing a firmness and consistency that enables it to stand shipping safely a thousand miles. The fruit hangs well on the plant after it is ripe, is not easily beaten off or injured by rains and keeps longer after picking than any other variety we have ever seen. None of our party were expert pickers, but several of them, being timed, managed to pick a full quart each in five minutes. Good pickers could have averaged a hundred quarts per day. We are told that last year a plantation of them yielded at the rate of 200 bushels per acre, and we should estimate that the patch will not fall much below that. The foliage this year shows no indication of weakness, and the yield of fruit is more than double that of other varieties adjoining on the same farm. We cannot but believe that Mr. Loudon has given the world a most valuable fruit, and that no fruit grower can afford to be long without a patch of it.

Mr. Loudon is now seventy-five years of age and has spent many of the best years of his life in trying to improve our small fruits by raising seedlings. He is the originator of the Jessie strawberry and several others not yet on the market. A genial old man, whose works will live long after he goes to his reward. He has sowed for others to reap.

HORTICULTURAL FRAUDS. (A TALK.)

E. H S. DARTT, OWATONNA.

Mr. President: I think this topic in our society is altogether out of place; yet if we have any frauds in our society it is our duty to point them out and bring them prominently before the public. Now, it has been said that "There are tricks in all trades but ours," and I think that applies and should be understood to mean that we have been foolish enough to expose our own tricks. You know that "A house divided against itself cannot stand," and if we go to work exposing these tricks here we shall get into trouble; we shall accuse some member of something he has or has not been guilty of, and he will accuse us of something we are or are not guilty of, and we will get up a regular family quarrel, and family quarrels of all things should be avoided.

This topic was assigned me by your secretary. I suppose he went on the theory that "It takes a rogue to catch a rogue," and I went to thinking the matter over and wondering what I should say or what I should write. I thought of all the mem-

bers of the society, and there is not one of them I hate; there is not one of them I want to kick unless he kicks me first, and I did not have any heart in my work. I could not think of any thing I ought to say, so I stopped writing, and I thought I would come up here and offer an excuse for not saying anything, and I don't know but what I have said enough already,—but if you really want me to say something about horticultural frauds I will try. I will first make my confession. (Laughter.)

Pres. Underwood: That will cover the ground. (Laughter.)

Mr. Dartt: Will that be all I need to say?

The Owatonna plum is an extra good one, large size and good quality. It came from Red Wing, brought to Owatonna by Dr. Johnson. I got the sprouts from him. I told him if he would dig me up a lot of sprouts I would give him other nursery stock in exchange, and he brought me a lot of them. I cultivated them, sold some of them, gave some of them away, and when they got to bearing they bore a very inferior wild plum. Consequently, I was instrumental in perpetrating a horticultural fraud. I have confessed, own up and plead innocence; I did not know I was selling a bogus tree, and I am trying now to get down to the genuine article, but whether I will live long enough to compensate the public, long enough to make good the fraud I have perpetuated, I do not know, but I am afraid not. If I was sure of that, it would be a consolation,—I would give them a great lot of them, would grow them for a hundred years and peddle them out. I have heard things just as bad of other fellows, other members of our society. I heard that the agent of a nursery company sold a begonia to a lady, and it grew, and after a while it proved to be a pie plant. (Laughter.) Of course, the agent came around again and the lady showed it to him, and after she showed it to him she told him to "git," and I suppose he "got." (Laughter.)

Now, there is a fraud that is perpetrated, and I think it was perpetrated at our last state fair. It was the rule at that fair that nobody should draw a premium on fruit that he did not grow himself. I have evidence that goes to show that there were premiums drawn on fruit that was not grown by the exhibitors. One tall man said in a joking way that he had bought out the Rochester fair and that a certain sandy whiskered man had bought out the La Crosse fair. I have evidence in my possession to show that "There is many a true word spoken in jest." (Laughter). Now, I concluded that as the man who is said to have bought out the La Crosse fair took

the first premium, that the La Crosse fair was a bigger concern than the Rochester fair. If that was the true way of it, absolutely true, I think those exhibitors were excusable. They were excusable on the ground that our society here educated them right up to that point. (Laughter). For the sake of the men not growing their own exhibits, it was thought best at the state fair to offer a large premium, that they called "sweepstakes." That encouraged men to beg, buy, borrow or steal fruit to place on the table for exhibition. Now, these men had practiced that and made their fruit exhibits and had received their money; they had had a great deal of training in that line. They say "It is hard to teach old dogs new tricks," and these men had become so accustomed to that sort of thing that they could not leave off all at once. (Laughter). Now, the strong probability is that by another year they will get all over it, and they will not exhibit any fruit that they have not grown.

I guess I have said enough, and I am perfectly willing that any of the other frauds should step in and make their confessions. (Laughter and applause).

Pres. Underwood: Are there any other confessions to make?

Mr. Harris: I have no confession to make in reference to the last state fair. There were only two specimens of Wisconsin apples there to my knowledge, one an Avista from A. J. Phillips, the other a Northwestern Greening from some source. All the apples I exhibited there in competition I grew.

Mr. Dartt: I want to offer a strong hint: "The bird that is hit always flutters." (Great laughter and applause).

Mr. Richardson: I had seriously thought of saying a word or two on this subject, but now that neighbor Dartt has given out this hint I shall keep still, as I am a nurseryman. (Laughter).

Mr. Harris: I will acknowledge that the plate of apples that Mr. Richardson brought there helped me very much, as he was kind enough to set it on my table.

Mr. Richardson: Mine were not entered.

Mr. Dartt: Harris' were entered. (Laughter).

Pres. Underwood: We would like to hear from Mr. Wedge.

Mr. Dartt: I do not think Mr. Wedge is a fraud. (Laughter).

Mr. Wedge: I have not come prepared to state the case which our president has in mind, but all of us in the southern part of the state that are all interested in horticulture have had our righteous souls vexed by the frauds that have been perpetrated by agents claiming to represent nurseries in northern Illinois, the Princeton Nurseries. Their scheme has been advertised all over the state, selling almost everything and delivering almost anything. Farmers paying about eight dollars for nursery stock that might possibly be of the value of two or three dollars. The law we have had, the law which protected our people from those frauds and which has worked for a number of years to keep such people out of the state, by a test case

brought at Albert Lea came under the ruling of the supreme court of the state, and they decided that our law was unconstitutional. I do not believe I need to go into the details of the case at all, but I believe we, as a society, ought to appoint a committee that would recommend legislation similar to that we had, only that should stand the test of the courts, which can very easily be accomplished, and which will work a great saving to the people of the state. It seems an outrage that such frauds should escape unpunished, as they do. I do not know that I have anything more to say. If you have any questions to ask in regard to this matter, I shall be glad to answer them. I think we ought to talk this thing up now.

President Underwood: If we have anything to say, let us say it briefly.

Mr. Harris: The question has now come to a point where a man is privileged to say something. There is no doubt there are frauds perpetrated on the planters of Minnesota. A nurseryman from some other state, or even in this state, gets hold of something, gives it a new name, or his agent claims it is propagated by some new process, which makes the story ten times more plausible; he sells it and he commits a fraud, and it was a fraud of that kind which created so much excitement in this state. One apple they advocated was the Salome apple. It is a small, red-striped apple, of good quality and a good keeper. There is no evidence that it is a good bearer. It can be bought for $4.50 per hundred of men who have stock on hand. The agent came in and sold those trees to planters for fifty cents to one dollar apiece, claiming they were budded—if they were budded, they were a bigger fraud than if they had been on their own roots.

We ought to have some law in this state that would prevent men from coming upon us and imposing upon those who are ignorant of fruits and the methods of propagation, making fraudulent representations to them, taking a dollar from them where twenty-five cents ought to pay the bill; and we ought to have laws like they have in California, requiring stock to be inspected before it is sent out. We have frauds enough already, and we ought to have waked up before and put them out. I am in favor of this society appointing a committee to define what we want, and to ask the legislature to pass an ironclad law that will put a man in the jug either for selling an old variety under a false name or deceiving the planter in any way. There is another remedy, and that is a law compelling every man who is a farmer in the state of Minnesota to join the State Horticultural Society, attend its meetings and read its reports; and then there will be no law necessary against frauds.

Mr. Dartt: I am afraid if the plan conveyed in that last remark was carried out, it would not work well. I am afraid it would spoil the effect of what he has said before. That would show clearly that we are figuring to get money into our treasury by compelling them to join our society. If he had changed it a little and said we should have a law requiring all fools to be killed, that would be more to the point. If we had such a law—that all fools in the state should be killed—then that would be a block in the way of those fraudulent fellows transacting their business, because they sell to

fools only; they do not sell to anybody else. Now, I think the law he has asked for would be impracticable. Of course, we would like to have our business protected; we would like to have all the frauds kept out or killed—don't care much which—but there are so many things in the way, so many branches to be protected, that it is impossible to protect them all by law in the way that this gentleman proposes.

I have thought that the nurseryman and the jeweler, the watch tinker, were about on a level in their ability to perpetrate frauds on the public. I know of a man who was coming down this way from Dakota, and on the way he found that his watch had stopped. He took it to a jeweler to be repaired and put in running order. The jeweler opened it, put on his eye-glass, and said, "There is a jewel broken in your watch; it cannot run until it is fixed." He supposed the man would leave his watch to be repaired. The man happened to be in a hurry, so he asked the jeweler how long it would take to fix it, and the jeweler said it would take a day or two. The man could not wait that long, so he came on to Owatonna. (They are all honest in Owatonna, and some of you may be living there.) He took it to a jeweler there who put on his eye-glass and looked into the watch. Then he took his little pincers and picked a little hair out of the hair spring, a little piece of hair that had become entangled in the hair spring, handed it back to the man, and it was all right. We could not go to work and pass laws preventing watch tinkers committing fraud; it would be impracticable. I think the best thing we can do is to educate our people to just as high a standpoint as we can and take things as they come. (Applause.)

Mr. Harris: I would suggest to Brother Dartt that instead of having the fools killed we have them educated.

Mr. Pearce: An old fellow used to tell me that experience taught us that fools could learn as well as others. I think we stand on an equal foundation. Fraud is punishable in any form in this state. All we have to do is to take the proper course of law, and we can put any kind of a fraud through. People must become educated; they must learn to know what the law is; they must use their own minds, their own judgment. Until they do that, we can pass all the laws we wish, and still they will be defrauded. Now, we want no law except what we have, a law to punish fraud. We want our Wisconsin nurserymen to come in and sell; we want Iowa nurserymen to come in and sell; we want everybody to come into our state and sell their goods, if they do it honestly, if they tell just what it is, so that every man, every one that buys trees or fruits can tell just what they are getting. Now, I want to stand on my own responsibility, accountable for everything I do, and that is just where every nurseryman should stand. I am not accountable for other frauds; I am not accountable for what another man does; if you go to deceive and defraud, I am innocent. I hope this matter will rest just where it is.

Mr. Kimball: I feel much interested in this matter, and feel like doing something to help protect my friends and neighbors. What Mr. Pearce says may be true, but when a party comes in from another state and represents to my neighbors that this or that is the proper thing to do, and they have not the experience to know whether

it is or not, but take him at his word and expend forty, fifty or seventy-five dollars for something that is worth less than half as much, or practically worth nothing to them, it is not so much a question of the money lost as it is of discouragement to the man or to his neighbors who engage in anything of that kind. Here is one of our neighbors who pays fifty to a hundred dollars for the best kind of fruits or trees, as he supposes, and they are an entire failure. He might as well throw his money away; and he will become so discouraged that he will never want to take hold of anything of the kind again, even if he knows it is good. The question of punishment of fraud is not so easily got at as some people suppose. An agent comes in and sells a bill of goods, and after a long time you find you have been defrauded, but you cannot get at the man—you do not know where to find him; and the man who has expended and lost fifty to seventy-five dollars will not spend another hundred to prosecute the man who has defrauded him. You would not do it, and no one else will do it, and the consequence is the entire neighborhood is discouraged. We can not expect to punish such frauds.

I have no ideas as to the form of law that is necessary in this case, but I think it should require those who wish to sell stock, some one that can be got at, to give the necessary security that they are responsible, and that they are responsible for the acts of their agents. We have our state law for the preservation of game, and it is probably all right. Some claim it is manipulated largely in the interest of sportsmen and not a benefit to any one as a matter of support. We have game wardens all over the state, and it becomes almost impossible to ship game out from any part of the state. I do not know under what terms these game wardens work, but it strikes me we might have wardens appointed to make it their business to look after the agents who come into this state to sell nursery stock and to see that they give bonds. They should have certain districts to work in and should be deputized to catch onto these agents as they come into the state and see that they are complying with the law. It may not be practicable, but if there is any law passed that might be one of its provisions, that there should be wardens appointed to catch onto those agents who come here for fraudulent purposes. In our neighborhood there has been more or less of this fraud perpetrated; trees have been sold for a dollar apiece that were absolutely worthless for our part of the country; still by talking smoothly they could make the people believe they were all right, get them interested and induce them to buy. Some of the trees that were sold for a dollar apiece could have been bought from most nurserymen for twenty to twenty-five cents apiece.

Mr. Philips, (of Wisconsin): I agree with Mr. Kimball that this is a matter of a good deal of importance. We are just now looking to you people a little to see what you are going to do in reference to this matter. I had a letter last Saturday from one of our prominent horticulturists saying he wanted me to watch closely the Minnesota people to see what they were going to do, and to send him a copy of the law you proposed to enact just as soon as I could. We need a law, and a good one. I know of agents who have traveled about during the past season and induced men to buy what they claim as

the Florence apple, said to have been originated by Mr. Gideon, of Excelsior. They showed it on their sample books as a large apple, as large as or larger than the Wolf River. They say it is hardy, does not blight and a good keeper. The fact of the matter is, it is a small apple, smaller than the Transcendent. Well, people buy those trees, pay fifty cents apiece for them, when they are entirely worthless to them. You may call them fools if you will, but that does not help the matter any. A great many buy to get rid of the agent. People are buying those trees; a lot of them have been sold in Wisconsin.

Men will buy trees, but after they bear they swear they will never buy another tree. A man told me last winter, "1 never had but one tree agent tell me the truth. He was selling the Salome apple, and he said it would keep all winter, and it will, for there is nothing on the place will eat it. He told the truth that time." Those agents go into localities where they have no horticultural meetings to sell their goods; they know all such localities. They sell them what they purport to be fine, large apples, budded on some hardy stock, and when they come to bear they are little, worthless things, no good on earth, and they curse the whole business. It is all right if a man can be placed on his own responsibility; there should be a power behind the throne; some one should be held responsible,or run the fellows out of town. We have plenty of nurserymen who are selling good trees of their own throughout our state. We should induce people to buy from our own nurserymen and run those fellows out who travel through the country and tell anything to sell their stuff.

Mr. Brand: We have a law on our statute books, or I do not know that it is a statute law either, but I know there was a case brought before the supreme court of the state twenty years or more ago that applied to this whole question of fraud. A man had ordered a bill of trees from a Minnesota nurseryman, grown in Minnesota, so the agent represented, and when he delivered the trees he furnished trees from Wisconsin, and the man that had ordered them neglected to go after them. He was sued in the justice court, and judgment was rendered against him; but he appealed it to the district court,and the judgment of the lower court was reversed, and the grounds on which it was reversed was that the man undertook to introduce evidence to show that fraud was intended and was not permitted to do so. The agent was beaten in the district court and carried it to the supreme court, and the supreme court sustained the decision of the district court that the man should have been permitted to introduce evidence showing fraud. It is plain to my mind that if evidence were allowed to be introduced to show the nature of the fraud, as the supreme court decided there might be, these agents could not get judgment even in a justice court, and this would furnish the farmers of the state a sufficient remedy, and I do not believe there is necessity for any fnrther legislation.

The reason why we had the last law—and I believe I had as much to do with it as anybody—was this: I had been traveling in a number of different states, and I knew they had a law with the same provisions, and it operated as a scarecrow to keep a good many of those

frauds out, and for that reason I proposed it here; and I stated at the time that I believed such a law could and would accomplish much good; it would give us the same benefits it gave to other states. I believe we have had considerable benefit from that law. The law might have been stronger, but the legislative committee that was appointed to go before the legislature was fooled by the lawyers, for, as I understood it, they submitted it according to the way they paid them. I should want a good lawyer to give an honest opinion, and we had better pay him a good fee. Lawyers have an interest in having unconstitutional laws passed. That is a part of their business; and if there is to be any further legislation on this subject, we had better make provision to engage one of the best lawyers we can find and pay him for his trouble.

Mr. Kimball: Mr. Brand brings up the question in regard to the punishment of fraud. But suppose a man buys trees in good faith, sets them out and finds out two years afterward that he has been defrauded; it is then too late to take steps to punish, and, if he could, he would not take the trouble to do so. When they find out they are are defrauded, how many farmers are going to spend several hundred dollars to go to Illinois and prosecute the party who committed the fraud? How many are there who, after such a time had elapsed could secure the evidence to convict? There is not one man in a hundred that purchases trees throughout the country, after having paid for them, who could offer any evidence that could be used in a legal form to show that he had ever purchased trees from the agent who defrauded him.

Mr. Dartt: My friend here seems to want some hook on the agent, somewhat in the same manner they confiscate the game that is contraband. Now, I rather think he would have no right to confiscate the stock the agent proposes to sell, because, if he did, he would have to prove that it was worthless, and he could not do that. So how are you going to get at him?

Mr. Ferris (of Iowa): I have had considerable experience with the budded tree men in our country. They canvassed our county a good many years. The state experiment station received the first specimen of the Salome apple. The apple is a trifle larger than the Transcendent, and the tree in hardiness compares about with the Snow. They agreed not to sell the tree for five years, and at the end of that time they had quite a stock. I bought the entire stock for four cents a tree. I sold it for ten cents a tree. The apple that many paid a dollar for, I sold for ten cents. The tree was not as hardy as the Plumb Cider. The trees that were delivered were part Ben Davis, part Walbridge, part Snow and part Salome, but as a rule they were Walbridge. I did not make any protest on the fraud, as I considered one Walbridge worth half a dozen Salome.

In my town I have run a nursery for twenty-five years. I made it a point to attend to my business as well as I would wish any one else to attend to his business. I have done the best I could, but I have had so many failures that I do not feel like bragging about what I have done,myself, at least. There are so many things I have been engaged in that have been failures, that I feel more and more every year like sticking to the old standby. These budded tree men

came to me, and I showed them over my nursery, used them like gentlemen; and then they went out and said they had examined my nursery,and I had acknowledged I set budded trees, not root grafts. For the last seven years I have shipped apples by carloads to Minneapolis. They said I was too smart to grow root grafts.

One of the best of our most intelligent men,whom I had known and who had been in business for twenty-five years in our town, bought a lot of their stock. I said to him, "Your orchard has been a success, why do you buy that?" He said he thought it was worth trying. When the trees were delivered my partner came to me and said he wished I would go up and expose their fraud, and this man came to me and said he wanted me to come and tell him whether his trees were budded or not. I went up there to the depot where they had the trees, and there was one man there who had bought a small bill and paid for it. I looked over the stock and knew enough to know a black-hearted tree when I saw it. I asked him if he would take forty cents for a tree I picked up. He said he would; I paid him the money, took out my knife and whittled right down to the root. I came to the root graft in perfect shape. One of the agents ran across the room and wanted to know what I was doing. I told him it was my tree,and I had paid for it. He said, "Don't you touch a tree that belongs to me." There were twenty men in there at least, and I said I was going to show those men who had bought trees how they had been defrauded, and that I would put up two dollars to their one that every single tree they had there was nothing but a root graft. I told the agent right there he lied and he knew he lied, and I told the farmers he had got their money under false pretenses. The agent left town, and we have never had a budded tree man there since, and I take a little pride in saying it. They took it up and advertised it in the papers how we had exposed the frauds that came into our state.

I think this is the proper way to meet those things; investigate them and expose the fraud. I think,if we were not quite so delicate in what we said when we know a fraud is being committed, it might be very beneficial to those people who are being defrauded.

Pres. Underwood: Is there any one else who would like to say anything on this subject? We are discussing horticultural frauds.

Mr. Wedge: Mr. Dartt seems to think that if we will depend upon education we can overcome this evil, as it is only fools that are taken in. He is very much mistaken in that matter. There may be horticultural fools among the better posted farmers—level headed men who are not often taken in by frauds of any kind—but our state is not blessed with a great many horticultural wiseacres. The greater share of our people are fools, horticulturally speaking, and it will take a great many years to educate them. If the budded tree fraud is discovered and becomes a stale thing, then they handle the seedling fruit or old root grafted trees; there is no limit to fraud. I apprehend that members of the State Horticultural Society are not taken in by these frauds, but you must remember that our membership is not one-tenth per cent. of the people of the state; No, not one thousanth of one per cent.

Now,in regard to this law. There is no law that will shut frauds out completely, but it seems to me it is the province of the law to shelter the ignorant and the weak from the strong and the cunning, and there is more need of protection in this direction than in any other. I think our people have been defrauded in this matter more than in any other way, especially within the last year or two. I think we should have a law that would place a limit somewhere on agents who are selling nursery stock throughout the state. It is a fact that Eastern firms are advertising for agents and are so careless that they employ agents that cannot be trusted. It seems to me that the nurserymen of the state—and all nurserymen—in sending out agents ought to be required to give bonds somewhat similar to those required under the late law which has proved unconstitutional. The reason it was unconstitutional was because it discriminated as against persons. The nurserymen in the state had advantages over those outside of the state. The law which I would propose would be a law which would place those nurserymen doing business in the state, no matter whether residents in the state or outside of it, under the same restriction, and require bonds similar to those required under the late law. It has also appeared to me that it might be a good thing, possibly, for the law to require that all fruit trees, apple, plum, cherry, pear, etc., sold within the state should be labeled as to the place of their growth; each tree should have a label attached to it. Our people are ready to pay a good price for good trees. They are not so particular about the price they pay, but they want something hardy and good; and we ought to protect them in their desire for something hardy and give them an opportunity to deal with men that are under certain restrictions to furnish them what they desire.

Mr. Dartt: Mr. Chairman, it seems to me that there would be a great deal of impracticability about any law that we could invent. It looks that way to me. A few years ago the matter of fraud in selling fruit trees was agitated, and I heard there was a plan on foot, or an effort made in the legislature, to get a law passed to punish nurserymen that sold black-hearted trees. There are a good many that think a black-hearted tree is good for nothing. I think a black-hearted tree, if it has a good growth throughout, may be a good tree. If that law had passed there would be no safety for me to sell trees at all, because if I sold them without cutting them open to see whether they were black-hearted there might be a black heart in them, and some other fellow would cut them open and find it; and if I cut open all my trees, I could not sell them; so I would have to stop entirely. That would be very impracticable, and so would all these other proposed laws; I think we would find a certain impracticability in all of them. Our friend Pearce has got about on the right track.

Mr. Wedge: I think perhaps it would be well to have some motion made in reference to this subject, that we could bring this matter to a vote. I move that the State Horticultural Society express itself in favor of a law similar to the late law that was on the statute books, which would protect our people from horticultural frauds,

and that our committee on legislation be asked to draft and secure the passage of such a law.

President Underwood: You can now talk to the qnestion, but be as brief as possible.

Mr. Wedge: My suggestion, which I thought you all understood, was that the law should provide that all nurserymen doing business in the state should have their agents put under bonds. Their business is all on the same footing.

Secretary Latham: I feel entirely in sympathy with the motion of Mr. Wedge, but it seems to me if it was changed a little it would be a little more practicable. I think a committee should be appointed to draft such a law; let it be submitted to the executive committee and then turned over to the committee on legislation to secure its passage If a law could be drawn here, to be submitted to the society, it would be all right.

Mr. Pearce: The only thing necessary is to have a law to prevent fraud; not to prohibit any other nurseryman to sell here, but to make the law which we already have stronger against fraud.

President Underwood: I think we understand the true sense of this motion. It is not to prevent anybody from selling, but it provides for the privilege of selling on the part of any nurseryman, in the United States or out of it, and requires them to give bonds for the faithful performance of their business and the honest fulfillment of their promises. Now, the question is on the matter of referring it to the committee on legislation, and Mr. Latham's suggestion is that it be referred to the executive committee.

Mr. Wedge: We want the sense of the society as to presenting it to that committee.

Secretary Latham: I think, perhaps, it would be better for Mr. Wedge to have his motion provide that the chair appoint a committee to frame such a law, and then refer it to the executive committee for approval, to be by them turned over to the legislative committee. The legislative committee is selected to work legislation through.

Mr. Wedge: I accept Mr. Latham's suggestion and change my motion accordingly.

Mr. Dartt: I believe if this bond theory is adopted in your law, it will be declared unconstitutional because it restricts trade. It says to a poor man, "You cannot go into the nursery business unless you are able to give a bond."

Pres. Underwood: They do the same thing by all the saloonkeepers in the state.

Mr. Dartt: The saloonkeepers make more money than the nurserymen do. They are sure to be rich, or else their backers are. I do not believe you can pass any law that will compel me to give bonds before entering upon legitimate branches of trade.

Mr. Clark: I am a commercial traveler. I travel in Montana where I have paid them $1,700 in license for the privilege of selling goods in that state. That law was afterwards declared unconstitutional. In another state they had virtually the same law, and some commercial travelers went to jail for refusing to pay the license.

The case was carried to the supreme court of the United States and there declared unconstitutional. The goods they were selling were legitimate; and I think the same rule would apply in the nursery line. I have my doubts whether you can formulate a law requiring a commercial traveler to pay a license or make him give bonds where he comes from another state with his goods or sample articles of commerce. I think trees are articles of commerce. You may pass such a law, making it apply the same to a nurseryman here in the state as to a nurseryman outside of the state, but I do not believe it would be held as applying to those outside; it would be decided unconstitutional, and then you would be in a worse fix than before, because you would be required to pay license and the other fellow would not.

Mr. Gould: The older members of the society will remember that a dozen years ago when this question or a similar one was up for discussion, I opposed the whole business, and it turns out now that I was correct in that, because the law was no good. I believe it casts a stigma upon the business of selling nursery stock. I am not speaking in defense of myself or my occupation, because I do not stand as a nurseryman, but I believe, as I always have believed, that the nursery business is as honorable as any other business, and I am almost out of patience with this whole matter. I do not see why the people are not well enough posted to get along and guard against and defend their own weaknesses without having a law enacted to protect them as if they were so many children; and as some speakers have stated before in reference to this matter, I believe it will be a difficult thing to frame a law that will amount to anything. I think nurserymen should have as good a footing in those matters as other people. I do not see why they should be held under legal enactments to keep their trade. I think this society above all others should not be a party to such a thing. If people in other occupations think it worth while to bring these matters out that we are discussing here, let them do it, but to do it ourselves I think is beneath our dignity.

Pres. Underwood; The question is now on the appointment of a committee of three to draft a law to be submitted to the executive committee, to be approved by them and afterwards submitted to the committee on legislation to secure its enactment.

On being put to vote the motion to appoint such a committee prevailed.

HOW TO ADORN HOME GROUNDS.

F. H. NUTTER, LANDSCAPE ARCHITECT, MINNEAPOLIS.

On this occasion, to introduce what I may have to say in regard to the improvement and ornamentation of the grounds immediately surrounding our homes by any extended argument as to the desirability of such a course of action, would be entirely uncalled for; still, there are many in our state who go to make up the field through which the influences of this society must be felt e'er it has accomplished its full mission, who do not yet appreciate the need of any such a work; and who, however much they may complain as to the dreariness of their surroundings and deplore the haste with which the children when they come of age leave the old home for the crowded cities or the fondly hoped-for land of promise in the farther West, still do not dream that there is anything that they can do to mitigate, if not to entirely undo, the evil.

The time has now passed in which "Uncle Sam is rich enough to give us all a farm," and so a check will be given e'er long to the drifting mania which has so distinguished our land, and the mass of population will become more fixed in their habitations and modes of living. The old homestead will then become a more important factor in family life, and the owners will work more zealously with the thought of future generations before them, unless, indeed, by that time some of our enthusiastic reformers have so arranged things that nobody can own anything.

Scorching summer winds and blinding winter blizzards soon convince the pioneer that the broad prairies, which under the smiling sun of May or June appeal so strongly to the poetic imaginations, have their drawbacks, and it is easy to persuade him of the utility of windbreaks of growing trees, but when this, the initial task of the adornment of his home is accomplished, how many seem to think that all has been done that could be expected. To be sure there are many tasks awaiting the home builder, and the strictly ornamental work may well be asked to wait a while, but we would urge the fact that a little forethought and careful planning may so arrange the necessary details of farm life that the useful and the ornamental may both be achieved at the same time. If the house or the other buildings are still to be located, that may and should be done with due thought of its results from an artistic standpoint and, also, as utility is a prime factor in the application of all true art, in such a manner as not to interfere needlessly with the covenient performance of the daily duties of the home.

The question of health should be one of the first to be considered, and in our scheme of home ornamentation all necessary measures should be taken to secure ample supplies of fresh air (which is very easily done in this country), of sunlight and, of still greater importance though often sadly neglected, plenty of pure water and a system of drainage that shall preserve the water supply and all the vicinity of the dwelling from the slightest contamination by sewerage and other household wastes. Too often has the "mysterious Providence" which has desolated some happy home, only been the outcome of man's carelessnes and ignorance.

The insidiousness of this danger is well shown by an incident occurring in an Eastern state. A gentleman of wealth purchased a location for a seaside cottage where it was literally founded upon a rock, the cellar was excavated in the solid granite and so was the cesspool, and at a considerable distance a well was sunk through the solid ledge until an abundant supply of cold sweet water was reached which was the boast of the place. After the house had been occupied for some time, a sudden and very fatal epidemic of typhoid fever broke out, not only in the family but among those who had been their guests, and raged to such an extent as to attract the attention of the state board of health, who instituted a thorough investigation, and at last it was discovered that a minute open seam in the granite intersected both the cesspool and the well, and the drinking water, while still clear and sweet to sight and taste, had become in reality a deadly poison.

One other point in regard to the location of the house, I wish to touch upon, and that is the prevailing notion that it is necessary for everything to stand "square with the world" as the saying is, and that sectional and other government survey lines are ordained to be the ruling factors in the location of roads, buildings and other improvements; to be sure there is no reason to disregard them unnecessarily, but if some advantage is to be gained, as the introducing of some particularly pleasant outlook from a veranda or living room window into our scheme of improvement, or getting the health giving sunlight into all our rooms, or the utilizing of some advantageous line of approach for the drive, let us not hesitate to ignore the north star and the compass needle.

The important points above mentioned having been fixed upon, we are ready to begin the more strictly ornamental part of our work: and it is well to insist that to obtain satisfactory results this work should be based upon a well considered plan in which the completed task has been pictured out in the designer's mind; and while it may not be drawn out upon paper, still even a rough pencil sketch will be of great assistance and, perhaps, may call the operator's attention to some important point which had been entirely overlooked.

As the skeleton of our design, we first must consider the drives and paths, although every place may present special problems of its own. There are certain maxims which may be observed in nearly every case, although none of them are like the "laws of the Medes and Persians, which altereth not."

Drives and paths are a source of expense both in construction and maintenance, and also have an intrusive appearance wherever they encroach upon the lawn, so, at the beginning, we will agree to introduce only those which are absolutely neccessary; the same reasons will also lead us to avoid bringing them across the lawn in front of the house or to make a carriage turn opposite the door, unless special reasons, as topography of ground or a considerable amount of calling on the part of those who come with carriages, exist.

The curved line of beauty is the ideal of most every one, yet very few appreciate the narrow margin which exists between a straight line and one which in practice will appear abruptly curved and dis-

torted; in fact, a line which when drafted seems almost straight, will when placed upon the ground, be found by the novice to have a surprising amount of curvature in it.

The drive, therefore, should be in the line of the most traffic and, having entered the gronnds, should approach the house in a very nearly direct line, governed by the topography of the ground, and passing by the side of the house, proceed onward to the barns or other farm buildings, if located in that direction.

Paths we will taboo,except where absolutely necessary,for reasons of economy and to avoid cutting up the lawn, though in places of considerable extent a path winding through the border plantations and enclosing the broad expanse of open lawn may be desireable.

Abrupt grades will prove fully as objectionable as distorted lines, and,especially, at entrance and house, the drive should be as nearly level as possible with due regard for drainage; and as water is the deadly enemy of good roads, care should be taken that none shall be allowed to remain on or near the driveway.

All questions of construction and grading of lawns or roads having been settled, we now come to the part of the work which too many have considered more ornamental than useful, the planting of our grounds; and the scheme must be a matter of special consideration in each case.

There are few locations which do not present us with features in the landscape which we at once divide into two classes, one to be preserved and incorporated into our design for improvement and the other which must be concealed, if possible; and by the proper arrangement of our trees and shrubs we must bring about the desired results.

If there be some distant lake or tree-crowned bluff or other point of interest which may break the monotony of the view, let us take care that no growing tree or shrub is placed so as to at last intercept it, even if we have to leave a gap in the windbreak which is so dear to the pioneer's heart, for by a little care in placing the removed trees as flankers we can probably save the view and at the same time keep out most of the obnoxious gales; as, however, a picture is unfinished till properly framed, so we may so arrange our planting that the prospect which was pleasing before becomes doubly so if seen through an opening guarded by drooping evergreens or under the overarching branches of some graceful elm.

I was much struck a few weeks since by the results obtained by the setting out of a couple of large trees in an open field in such a way as to enclose a certain portion of what had been before a broad and rather monotonous lake view; the vista of water with the distant wooded shore seemed to start into view as when one focuses a telescope or field glass.

If, as sometimes happens, the distant view is attractive, while between it and us there are objects disagreeable to look upon, we may, perhaps, introduce low growing shrubberies, which, while they blot out the foreground, do not interfere with the prospect we wish to preserve.

Many localities in this prairie land, however, do not possess any very attractive features, and in such cases the usual windbreak of growing trees, if it enclose land enough for our purpose, is of much value to us, for it becomes the frame of the picture we would create. The sides of the same towards the house should be added to by the irregular planting of trees and shrubs, projecting out into the lawn like promentories into a lake, to enclose quiet bays of sunlit sod, so arranged that as we pass from room to room in the house or through the grounds we may obtain constantly changing views.

An occasional choice tree may be placed on the lawn, but care must be taken not to overdo it, nor to arrange them in mathematical order, while thick planting close to the house will generally prove particularly objectionable; it is well, however, to introduce near to and around the house groups of low growing shrubs, which serve to unite the buildings with the grounds in such a way as to make both a component part of the picture, rather than conveying the idea of a temporary structure, as is often the appearance of a building on the bare prairie.

As to choice of varieties of trees and shrubs for our planting, little need be said in this presence, but I fear that I may meet the disapprobation of the nurserymen by advising that no experiments be tried with interesting and enticing novelties till all the main features of the design be brought out in such absolutely handy and reliable species that any failure of new and untried varieties may not serve as a blemish upon the whole. Although nursery grown specimens are of course preferable for transplanting, no one need despair of the results who will, with due care, draw upon the resources of the fields and woods in his vicinity. In a comparison which I have made of a catalogue of one of the largest nurseries of the country with a recent state botany, I find that 39 varieties of trees and 33 varieties of shrubs therein recommended for ornamental purposes are found native to some part of Minnesota; and, doubtless, some varieties and "sports" are now growing in our vicinity which will prove of value for our purpose, wherever they have been brought to light by some intelligent and interested observer.

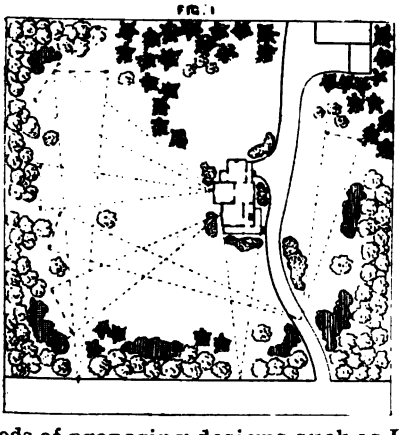
It is by the thoughtful selection and arrangement of the proper varieties that the full beauties of our plantations are to be brought out through the changing seasons; if flowering shrubs are our hobby, then an assortment which would fill the season from May to October should be made, while if autumnal color be desired, our scarlet oaks, maples, sumachs and other native species cannot be expelled; shrubs and vines with bright colored and persistent berries, as the scarlet-berried elder, the black elder, tree cranberry, woodbine and bittersweet are of much value; and if we wish to brighten the winter landscape, in addition to our hardy evergreens, we can summon to our aid the golden willow, the scarlet dogwood and the moosewood, or striped maple, to finish the much desired color effect.

The flower lovers may claim that our scheme has neglected their particular interests, and so it has, for only in exceptional cases will there be found time to care for annual plants; but to those whose tastes run in that direction, the introduction of perennial flowering

plants in masses around the house or in connection with the shrubberies will be a desirable addition which may be made in perfect harmony with the rest of the work.

Personally, I must confess a great dislike to some of the modern uses of foliage and other plants in what would in fireworks be styled "set pieces," notwithstanding the fact that I have recently seen in reputable gardening journals directions for constructing on the lawn a full rigged sloop, and also a floral sawbuck and log of wood; though, perhaps, an inborn antipathy that I possess to the last named articles may prejudice me against them, even when veiled with flowers.

But I fear some may say, "You are firing over our heads, and talking of these things on a scale much too large for us to undertake." I would reply, that my endeavor has been to bring out briefly the principles of art as applied to landscape work, that each may select the point which may be of the most immediate benefit to him and, also, as I have already hinted, form an ideal towards which all his labors may tend; so, if this coming season there be only a group of evergreens set out or a vine or two transplanted from the woods, it may be done after due consideration of final results and with a proper comprehension of the capabilities of the place.



There are other lines of thought which naturally spring from our subject, especially in connection with organized work for village improvements, cemeteries and parks and play grounds, all of which have a reflex influence, at least, on our homes and home grounds, but we cannot consider them at this time.

The drawings which I place before you were not prepared to show the only way and, perhaps, not even the best way of treating the tracts thereon shown, but principally to give the methods of preparing designs such as I have suggested. So I will close by a brief explanation of the plans.

In all of them the star-shaped characters represent evergreens, the masses shaded with dots represent low shrubs which will not grow to such a height as to prevent our looking over them, while those shaded with parallel lines indicate shrubs of larger growth, which in the center or at the back of the groups may develop almost into small trees. The other characters show the location of deciduous trees, single or in groups, as the case may be. The dotted lines show the lines of sight, or vistas, before mentioned which must be kept free from all obstructions.

Figure 1 is supposed to be a tract of level land in an uninteresting locality, where we make our picture all within our protecting tree plantations.

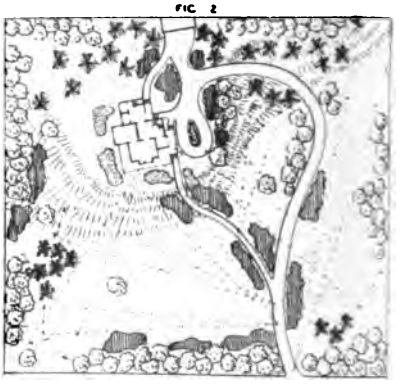
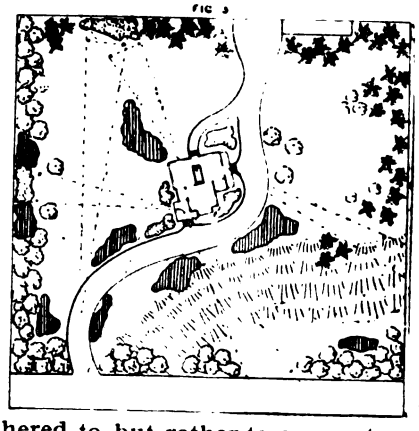


Figure 2 shows a place where the house is located on the point of a plateau some 30 feet above the street, thus necessitating quite a detour in the drive to overcome the grade as it approaches the dwelling; the hillside up which it passes, being thickly planted with evergreens, has the effect of a wooded glen. To accommodate foot passengers, a path affords a more direct way of reaching the house, while openings in the boundary plantations enable us to view the distant landscape.

In figure 3 an interesting hillside compels us to violate one of the rules already laid down, and carry the drive *back* across the lawn in front of the house. Here we also get distant views in different directions, the openings through the trees in the rear and to the left of the house being filled with low shrubberies to conceal some unsightly objects near at hand.



And, finally, I wish to reiterate what I have already stated once or twice, that what has been said and shown in this connection is not intended to set forth rules to be always strictly adhered to, but rather to suggest methods which in practice should be modified or not, as thoughtful study of each individual case may indicate.

DISCUSSION

Pres. Underwood: This is one of the most interesting and important papers we have had; it is now open for discussion. If you have any questions you wish to ask Prof. Nutter, you can do so now.

Sec'y Latham: Mr. President, I am very much interested in this paper. I brings out in a very clear and concise manner the possibilities of landscape gardening as applied to our homes, and I hope we shall be able to publish these three maps and, perhaps, the one that is now in the other room, in our maga-

zine, so our members may have an opportunity of studying the subject. It will certainly be profitable employment.

Pres. Underwood: We are glad to have this interesting subject talked upon. It is one that interests me very much, too. I remember how often I have seen farm buildings, as well as buildings in our cities located without any thought as to improving their surroundings. I shall never forget the visit I paid a farm belonging to a very intelligent farmer. The first place I came to when I reached the place was the barnyard. I had to open a gate to drive through the barnyard, and then I hitched my horse in the barnyard with the possibility of having him kicked to death by the other horses; and then I had to open a gate and go through the hogyard, and finally I came to the yard where the house was located. Of course, not all farmhouses are so situated, but a great many of them have no suggestion of beauty or adornment about them. I hope every one who takes our magazine will have the privilege of reading this article and seeing how these grounds are laid out and get the benefit of these suggestions.

Mr. Elliot: Doubtless this farmyard which the president has so graphically described was one that was arranged with a special view to keeping out tree peddlers. (Laughter.) But, setting aside all joking, how many times do we see in the prairie and in the wooded countries how by a little taste and effort they could arrange their buildings in suitable locations and with a little labor and time they could make pleasant homes that would be surrounded by trees and in after years would be cheerful and beautiful. I think, as a general rule, the farmers of Minnesota do not give these things enough thought and attention. It takes but a little time to plant a tree and a little exercise—but most of you have trees right in your groves, or they are to be found in almost any locality. Of course, those people who are engaged in the nursery business or in gardening appreciate these things more than does the average farmer, but some of the farmers have wives who have tastes in this direction, and they will be interested in having some ornamentation around their homes.

Mr. Pearce: I am located in a place where there is much pride taken in trees and yards. It is a subject that I have studied a great deal. I have a great many trees growing in my grounds. Trees should be arranged in a certain way. The various trees should be put out with a special object in view. You must have a variety of trees, but variety is not all. There

is just as much difference in trees as there is between one and two—just exactly the same difference. I do not suppose that any one has been more careful in the selection of trees than I have been. I have there the white birch; it is a weeping tree; it is beautiful. People ask me, "Where did you get it?" It is a native right here. Here are elms, magnificent elms, branching out in every direction. Everybody admires them who has any taste for trees. An oak is not what you want. The branches of an elm shade and protect the roots. They branch out in a horizontal direction just as far as the limbs reach out. It is the same way with the white birch; and I might go on and name the ash and the box elder. From most of these you can get a tree that will suit you. I have seen trees growing in yards that people thought were beautiful, that I would not want in my yard; they were disgusting to look at. It is all in intelligence in selection; it is all selection.

Another thing I want to notice. Every improvement I make, I make it a point to conceal by it—to hide everything that is beautiful—, and it seems a good deal more beautiful, and the surprise is a good deal greater to find it all at once. That has been a study with me. And then when you come to ornamental roses—I think they are the most beautiful flowers I have got; there is nothing like the rose. You want to get hardy roses. The most beautiful roses are the Jacqueminot, Madame Plantier, Baltimore Belle, Seven Sisters, Prairie Queen and lots of others. You just want to arrange them right. I have heard hundreds of people in passing by my house in carriages when these roses were in bloom, and they came on them all at once, they would just scream! The pressure was too great; they couldn't stand it. It is all in the way it is fixed up. I can make a paradise out of a place. I can make such a place that the children will say, "Pa, you shall never sell it." What do you think of it? What do you think of it? (Laughter and applause.)

Mr. Moyer: I am very glad to see these maps here, and I think we should all be very glad to see these maps of Prof. Nutter's published. The great trouble in tree planting in western Minnesota is that the trees are all planted in straight rows and only one variety at that. This might be much improved by setting them out promiscously without any particular design.

OUR WILD FLOWER SHOWS.

MISS CORNELIA PORTER.

(Read at the Summer Meeting, 1895, of the Wisconsin State Horticultural Society.)

In considering the subject of "Wild Flower Shows," it presents itself to me in two phases: the influence past exhibits have had in awakening an interest in our native flora, and the possibilities which lie in future exhibits to make this interest an incentive to learn more about our wild flowers.

Our local wild flower exhibits had their origin in an experiment. Four years ago, in the spring of 1891, a few of our flower-loving citizens conceived the idea of such an exhibit for the purpose of interesting the school children, especially the botany classes, in this work. Accordingly a meeting was called to consider the feasibility of having a wild flower show. The ladies were requested to be present, but only one was in attendance. Arrangements were made at this meeting for an "Apple Blossom Show," to be given the 16th of May. Wild crab apple blossoms were to be made the principal feature of this exhibit. Four premiums were offered:

1. To any member of the botany class for the most tastefully arranged basket of wild flowers, a choice painting.
2. Plants and seeds to the amount of $1.50 to any scholar for the most tasteful arrangement of wild apple blossoms.
3. Plants and seeds to the amount of $1.50 to any scholar for the prettiest show of wild flowers.
4. By the horticultural society, $1.00, to any member for the best grown pot plant in bloom.

Owing to the uncertainty of the result of this experiment it was decided to have the exhibit at a private home, and Mrs. Crouch kindly opened her house for the occasion. Since the exhibit was to be given chiefly for the benefit of the schools, only pupils were permitted to make entries for premiums (with one exception, that of $1.00 given for the best grown pot plant). Early on the afternoon of May 16, the flowers began to come in, and before evening the number of entries surpassed all expectations. Although the exhibit consisted mostly of wild flowers, yet the display was greatly enhanced by choice cut flowers and pot plants from the gardens and greenhouses of our home florists.

Encouraged by a large and varied collection of wild flowers and the large number of people in attendance at this "Apple Blossom Show," the horticultural society made extended arrangements in the spring of 1892 for a repetition. They decided to hold the exhibit at the courthouse. The number of premiums was increased from four to eleven. The increase of displays which followed these inducements justified the action. The following year, being the year of the World's Fair, it was decided to postpone the exhibit, but in the spring of 1894 the horticultural society again made preparations for a wild flower show. So generously had the pupils responded to the offers of the horticultural society at the previous shows, that twenty premiums were offered, five times the number offered three years before. With one exception the premiums were upon wild flowers, and the fact that of the twenty premiums offered, eleven

came from as many leading business firms is significant of the recognition this movement received. This exhibit was the best of the three. One hundred and thirty entries were made, and the court-room was found too small to arrange the collection to the best advantage, nor was the seating capacity equal to the increased attendance.

The above facts show that these wild flower exhibits have been potent in arousing a vigorous interest; yet, this is the least of the good work done.

The botany classes of our high school have used these exhibits to good advantage. Pupils in collecting their flowers have not only become enthusiastic upon the subject, but have learned to observe more carefully. The finding of a new plant created a desire to know its name; and the name, so often the result of some peculiarity, led to a closer inspection of the plant. Children from the age of seven to seventeen and over have been engaged in this work. In consideration of this fact a suggestion may be made here in regard to having a primary and senior class of exhibits. The children gather their own flowers and, unless a thoughtful parent help, they also arrange them. The efforts of these little ones should hardly be judged with those who have had several years of experience in this work.

Not only the children but adults have been benefited by these shows. People came to be entertained but went away surprised at the large number of kinds of wild flowers found in the vicinity of Baraboo. Many a flower of modest color hidden in tall grasses or in the shadow of fallen logs escapes the eye of the careless rambler through fields and woods; but purpose sharpens the eyes,and these retiring plants have not escaped the boys and girls, intent on collecting flowers for our wild flower shows. Each year has brought an increased variety. The late frosts of 1894 must have killed many of the earlier flowers, still this spring found the greatest variety of all. Thus the exhibits have given some idea of the range of our flora; and, yet,but a small fraction of our flora has been represented.

Coming, as they have heretofore, in the spring of the year, our shows have brought into notice spring plants only. The majority of our summer and fall flowers are generally unknown. Would it not be advisable to vary the time ot the exhibits during successive years and introduce midsummer and fall display? At these the fruits of the spring flowers could be given a place. So many plants are recognized only by their blossoms. A display of fruits would in a measure correct this fault. Those who visit the woods from April to November know that in midsummer and in September are found some of our choicest blossoms. The fringed gentian, dainty as it is, scorns the summer heat and opens only to a late September or an October sun. It thrives best when there is a touch of frost in the air. In the fall also are found the brilliant fruits of the bittersweet, the wild honeysuckle, jack-in-the-pulpit, rose-hips and hawthorn. Such exhibits given at different seasons would give a better knowledge of our plants.

The literary programs have thus far been a part of the movement, and added much to the entertainment of the public. Yet, would not the end of these exhibits be promoted if these programs were made up of prize papers, always with a generous sprinkling of music? For example, let there be a call for a paper upon the hepatica. The plant is to be observed in its habitat, and its habits are to be thoroughly studied. Thus all material must come through observation, and the paper must of necessity be original. The competitors should be confined to a chosen grade, a date should be set at which time these papers are to be in the hands of the judges. The paper adjudged worthy of the prize should hold a place on the program. Thus some ten subjects could be chosen, one adapted to each grade of our schools, including the first primaries. These little folks are capable of much more than is generally credited to them. This plan would involve some tiresome work for the judges, but we presume on the philanthropy of those who have so nobly inaugurated and encouraged this movement for the benefit of the school children, and feel confident there are those among them who would pay even this tax upon their generosity. Certainly this measure would prompt many to take part in a work the value of which cannot be overestimated.

FARMERS' INSTITUTES.

A DISCUSSION.

Mr. O. C. Gregg: I am in hearty sympathy with your socity in this matter. I want to sum up the suggestions that have been made here, and read you a letter from Mr. McKerrow, of Wisconsin, in regard to the Wisconsin system, which, as was said here, if adopted by Minnesota would be an improvement. I want to give you some facts. In the first place when this institute work began I went to Madison to Mr. Morrison and talked with him and also attended their institutes and studied their methods. I received some very plain instructions from him. I got some suggestions from him of value; but I want to say right here—and I could give you the details—I went deliberately to work contrary to his instructions and began the institute work in Minnesota. I violated some of his instruc tions for seven years. You know whether our institute work in Minnesota has been successful or not. Why did I differ with Mr. Morrison? Simply because I saw that our conditions were different from those in Wisconsin. Minnesota had been until that time a wheat growing state. and I submit to you this morning that a wheat field is not the place to gather hog experience. Now, in the second place, I will give you some statements, and I can back it up by the best men in Wisconsin.

One of the leading men of Wisconsin said to me: "Mr. Gregg, don't you make the mistake of Wisconsin by attempting to run four corps over your state." I will not give you names. I could give you the names of some of the leading men of Wisconsin who talked to me in the same strain, but I have not time to do it here. I want to say right here I appreciate the interest you take in institute work. I have a list that I hold in sacred remembrance, and that is a list of people who helped to establish the institute work in Minnesota. In that list I put the body of the horticultural society, so any suggestions you may make, any criticisms you may have to offer will be all right.

Mr. Elliot: How can we push our horticultural work with the institute work to the best advantage?

Mr. Gregg: In the first place, let me tell you we have got to be close observers; we have got to take people as they come. You must remember the speaker on the platform must understand the audience. You take the theme of horticulture this morning and put yourselves in the place of the audience. This is not a representative institute audience. You understand better than I can tell you that some papers that would interest you as a body would not interest an institute audience—and before such a paper was finished there would not be enough left of the audience to pronounce a benediction on. There is a difference of opinion. You must remember I was cradled in the church, and this is one kind of missionary work.

Mr. Gould: What would you propose as the best method of introducing this question before those institute audiences which you are supposed to instruct?

Mr. Gregg: Do you members fully appreciate what we have already done? We issue every year a book of twenty thousand copies. These books are electrotyped; it takes twenty thousand pounds of paper—over a carload of paper. Compare that circulation with the circulation of your literature. The difficulty is to get good men to take the platform; I must make some changes in the corps now. There are some when they take the platform act like a wet blanket on the audience. But we have some grand workers. One is a classic in hogs, another is a poem in poultry: Theodore Louis and Mrs. Tilson. I want to say right here that our friend Somerville, with his peculiar ways, his farmer look and his granger talk has done more for horticulture than more than half of you have any idea of. I might refer to the criticisms that were continually coming to my ears. "Gregg, can't you do some more?" "Have you got another Somerville?" The minute he gets up to talk he gets in his farmer certificate all over, and the farmer thinks he is going to get the truth, and he gets it, too. We must understand the people; we must study their natures; and if we do this and impart some of our enthusiasm to them by a good, warm, hearty hand shake—if I do not have a flock of people around the platform, I think I have made a mistake.

Dr. Frisselle: As I understood Mr. Gregg in the discussion of this matter, I think he gave us the idea that one corps of institute workers was sufficient in this state. We had a little discussion this morning in regard to putting more workers in the field. There are eighty or more counties in the state, and one corps is not sufficient to do the work as it should be done. Some here have spoken about the work in Wisconsin, and I would like to ask the chair to ask Mr. Collins, the editor of the Northwestern Agriculturist, who has some knowledge of the situation in Wisconsin, to say a word in regard to the matter.

Mr. Collins: Mr. President, ladies and gentlemen: I have been interested in this work of extending our institutes in Minnesota, and have been in correspondence with parties who are informed on the subject, and, before I continue, I desire to say that there is no greater admirer of the work of the institute in Minnesota than myself, but at the same time I feel that there is a demand for more of the same kind of work. There are eighty counties in the state, and it is impossible for one institute corps to cover it well. The entire state is taxed for the support of this work, and the entire state has a right to receive instruction from the state. Agriculture in the Northwest is undergoing a great revolution, and we who are engaged in the work of keeping track of the work of agriculture are interested in knowing that that revolution takes its course. It is impossible for one broom to sweep back the flood, and it is impossible for one man or set of men to keep this revolution in its proper course. I know of no other state in the Northwest which confines its institutes to a single corps. All other states surrounding us, all of them, have adopted this other plan, and why it is that the conditions are so different in Minnesota that we can have but three or four workers in the field to teach the farmers that there is something to do besides raising wheat or even dairying or raising poultry, I do not know. It seems to me there must certainly be more men like Mr. Somerville. There must be men in all branches of the work who can do good, and the idea of having a single corps in the field is like the idea of publishing a book instead of a newspaper. It is the continuous dropping of water that wears away the stone rather than the flood. It is the repeated work of educating farmers, getting farmers together and talking about and discussing these matters rather than coming before them and lecturing to them. If we can get the farmers together it will create the work. Here are counties in which there is no great demand for institute work; they do no realize of what value an institute would be to them, what it would do for them. If we can send one institute corps there, even if it does not rank with the present standard, it will create a demand in time for more instruction.

Mr. Gregg: They may have this system of having more than one corps in the field in other states, but that is not saying that they are successful. I know they are not. I am going to give you a name to back what I am saying. The present director of the Iowa Experiment Station, Mr. Smith, in a conversation I had with him recently, told me the present system of institute work in Iowa was an absolute

failure. I know all about their work there. Mr. Smith says it is an absolute failure; there is no economy about it; and just as quick as they can do so they are going to adopt the system we use in Minnesota. I have thoroughly studied this condition; I have nothing else on my mind, and we must observe all those things that go to make the work successful—and I tell you it is quality that counts and not quantity. (Applause).

Mr. Somerville: I am too old to be flattered, but I know there are a number of people who in all probability could fill the place I have occupied a great deal better than I. I did the best I could. In regard to the institutes in Iowa, I have just been there, and I have been over the state considerably, and they claim that their institutes are a failure, in part, and they hold their institutes almost to empty chairs. Then, again, as I said this morning, Mr. Gregg makes a book. He issues about twenty thousand copies of that book each year, and I am sorry to say there has not been interest enough taken in that work to put more of our horticultural matter in that book than has been done. The people of the state are entitled to it. I have been to an institute where there have been six hundred books distributed. The people want the books and every person is entitled to one,and they should have them,and we ought to put more of our horticultural work in Mr. Gregg's book, because it has a wider circulation than the book that is gotten out by this society. There has been more advancement in the interests of horticulture in the last four years than ever before. I can show you over two hundred letters at my house today from people all over the state wherever an institute has been held, inquiring of me in regard to horticulture—and we certainly ought to have that kind of things printed in that book for the benefit of those people who are interested in horticulture, but who are not reached by the publications of this society. I have letters from all over the state. I have had ten to fifteen men at my place from all over the state to see whether my works corresponded with my talks, and they have generally gone away satisfied that I was a granger with hayseed in my hair, and that what I said was true. We should encourage every effort that is put forth to get the farmers waked up to this interest of horticulture.

Geo. J. Kellogg, (Wisconsin): Reference was made to the work of institutes. It it astonishing that you have not more than one man in Minnesota that can hold an audience. We have plenty of them in Wisconsin. If you want any workers we can furnish you a dozen or more. We have practical men who understand the work, men that are right up to the times. I have not heard of a failure of an institute. We have a horticulturist at every institute, and he is on every program. I think, for the size of the state and the work that needs to be done, you should carry four institute corps in Minnesota, and I do not think they would be a failure either.

Apple Bulletin for August.

A. J. PHILIPS, SECY., WISCONSIN STATE HORTICULTURAL SOCIETY.

As practiced by himself.

This is condensed, and if any one can cull out anything that they can apply to their particular case, location or surroundings, do so. If not, write and tell me why.

1. Stop cultivating among your grafts, young trees, vines, bushes, etc., so as to give them the best possible chance to ripen their wood for the coming hard (or mild) winter, and, if they persist in growing too late, pinch off the tips of the leaders.

2. Get old hay, straw or listen to your wife and cut the weeds around the house and fences and put all that around the bearing trees and some manure with it when the June or other grass is taking possession and try and have the soil around all trees so that the rains can nourish the roots instead of running somewhere else.

3. Begin picking the apples from the heaviest loaded trees as soon as they will do to cook and take them to market, for there is many a good housewife who will be too glad to get them to make a pie to please her husband, who knows that you cannot raise apples in Wisconsin or Minnesota. This will keep the trees from breaking down and make the man better natured, and those left will grow larger, and, though it is more work, you will get more money from the crop.

4. Do not believe all that a man says when he tells you to pinch off half the apples and throw them away and expect the balance when ripe to weigh as much as the whole would have done in case none were picked and expect the work of the tree in ripening the fruit and perfecting the remaining seeds to be only half as much—this can't be done in my orchard, only partially.

5. In picking your apples to ship or sell at home, sort them carefully—better give the poor ones to some family where the children have no apples than to send them with the good ones. Place a layer of average apples, stem end down, in the end of barrel that is to be opened, and see to it and learn your boys or hired help to be careful that the apples run alike through the barrel. You need not wast ink, paper and time to write this to the commission man or other customers; they will find it out quick enough.

6. Do not make a fool of yourself and kick the tree peddler off from your premises, who calls on you this month. It will discourage him and do you no good. Invite him into the house and ask him whose trees he is selling, and, if you find they are to come from the south or east, tell him in a kind, fatherly way that Wisconsin and Minnesota can grow all the good apple trees they need, and that home grown trees for several reasons are better for the Northwest, especially if they have been grown on clay or limestone land, and quietly tell him when it comes to the new improved varieties that the two states I have mentioned are right up to the front.

7. Do not scold the boys or girls who pick your fruit this month because they eat a mellow apple occasionally. Remember two things: first, that this is the first fruit of the season and tastes awful good, and, second, that you were once a boy yourself and liked apples and even took some on the sly and hid them in the haymow until they were good. Better by far to find a boy with some apples in his pocket taking them to his mother, sister or best girl, than to see him with a vile cigarette in his mouth. Boys, think of this and govern yourselves accordingly.

8. Do not idle your time away this month and then try to do your budding to improve your trees in November, because it can't be done; but as soon as the buds are matured enough to grow and you find the young limbs with sap moving freely, go right at it. If you cannot do it, get some of Prof. Goff's students or some apple grower to show you how. Do this now for two reasons: first, because you are six months ahead in the work of next spring's grafting, and, second, if your bud fails to grow you can next spring graft the same limb. Don't you see? Remember, one young tree well budded or grafted, is worth ten or twenty old ones, because a bud or graft in this climate will not do well on an old tree.

9. This month is a good time to cut the suckers and sprouts from about the trees and gather the brush out of the orchard. Pull the yellow docks, thistles and burdock, and take the whole mess to some meadow you intend to plow, and there, without any regrets or compunctions of conscience, burn it up, root and branch, and scatter the ashes to the four winds of heaven, or carry them to the strawberry bed or put them around the tree that you expect to pick the apples from to beat your competitor at the fair, or put them around your Columbian or Loudon raspberries.

10. This is one of the very best months of the year to save one dollar of your apple or other money and send to me at Salem, Wis. It will make you a member of the Wisconsin State Horticultural Society, whose report will be sent you free as soon as published. It will also make you a subscriber for the year to the "Minnesota Horticulturist," any number of which is worth a dollar to the horticulturist. This will keep you posted so you will not be imposed on by every Tom, Dick or Harry who tries to sell you worthless stuff with high-sounding names.

This is my first monthly bulletin, and should it be my last, try and remember something I have told you, especially the last, where I said save a dollar and join the Horticultural Society (if you are a Minnesotian join the Minnesota society, of course). Get the best thoughts from the best horticulturists, and it will make you a better father, husband, citizen and fruit grower.

August Calendar.

J. S. HARRIS.

ORCHARD.

From this date until all growths have ceased, cultivation in the orchard should be discontinued, nor should pruning be done in this month except to rub off water shoots and buds that start where branches will not be wanted. Sprouts from the roots and about the base of the trunk should be removed whenever they appear. Budding is generally best done in this month. It must be done while the bark of the stock will raise easily. August is generally the most trying month on newly planted trees, and they should be kept liberally mulched. Where they have long bare trunks, it is well to wrap them with white cotton cloth or give them a coat of whitewash to retard evaporation and prevent sunscald.

INSECTS.

The worms of the codling moth are now in the windfall apples which should be kept picked up and fed to the hogs or otherwise destroyed. Bands and other traps upon the trunks of the trees should be looked to once a week and the worms that are under or in them destroyed. It is also in order to search for and destroy the borer.

NURSERY.

In the nursery continue cultivation, hoeing and shaping the trees up to the middle or twentieth of the month, but after that time let them rest, or a late fall growth may be stimulated.

STRAWBERRIES.

The new beds should be kept scrupulously clean of all weeds and grass. In cultivating gradually make the cultivator narrower, and always go in the same direction between the rows. This is to avoid tearing out the runners and newly rooted plants. Old beds to be kept over should be well manured and kept clear from weeds.

RASPBERRIES.

All things considered, it is best to remove all old canes as soon as the picking is ended. All surplus canes and suckers should be taken out in order to give those retained for fruiting the fullest chance for development.

BLACKBERRIES.

The blackberry harvest is now on. Fruit for shipping long distances must be gathered before it is over-ripe, but for home use should be fully ripe. If the canes for next years fruiting were not headed back early, they may be pinched back to four or five feet at

once, but no later pruning should be done. Four or five canes are enough for each stool, and all others should be removed. Cultivation should not be continued later than the middle of the month.

KITCHEN AND MARKET GARDEN.

Weed killing will still be required. A weed that goes to seed now means a full supply of young plants to stock the ground next season; wherever a portion of the crop is removed, an occasional run of the cultivator will help to keep them down and improve the condition of the soil. It is better to sow rye or buckwheat on such patches and plow them under before seed is ripe than to leave the ground bare.

IRRIGATING WITH CLAY TILING.

(A good Suggestion.)

"I am *more* than than satisfied with my sub-irrigation plant. I have been running my pump all winter, and have my three acres all soaked up and in fine shape for gardening in the spring. Last spring I put in 300 feet of tiling, and I found that I could raise anything I planted. Some say it is too expensive. My garden is in town,and if I had to build a reservoir on it the land that I would have to use for that purpose would almost buy the tiling. As I pump direct into the tiling, this does away with the reservoirs.

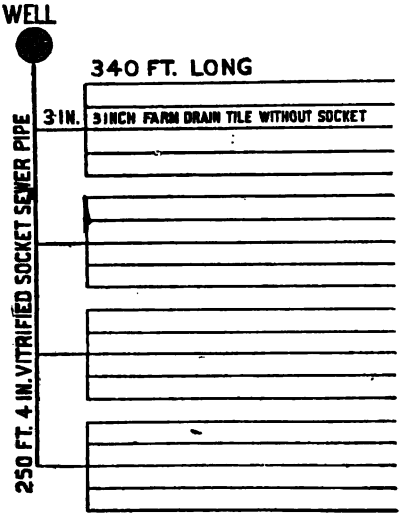


DIAGRAM OF ARRANGEMENT OF TILING.

"I have my tiling so arranged that I can wet any part of my garden whenever I choose. My tiling (3-inch) is laid 16 inches deep, and the moisture comes up to the top when thoroughly soaked. I have a well 43 feet deep. I use a 5-inch pump and a 12-foot mill. I can lift 800 barrels per day, and there is no evaporation, as it pumps direct into the tiling."—Irrigation Age.

FRUIT EXHIBIT AT THE STATE FAIR.

COMMUNICATION FROM WYMAN ELLIOT.

DEAR FRIEND AND FELLOW MEMBERS:—As many of you know, the State Agricultural Society has honored me with the office of First Vice-President in that association, and, as some duties go along with this honor, on account of my acquaintance and interest in horticulture, they have made me superintendent of that department for the coming state fair.

I should have been better pleased to hold this position at a time when the management had more money to put into premiums and the fruit crop was better, but with the assistance of my friends in horticulture, which, as ever, will, I am sure, be heartily given, we shall make the best of the somewhat unfavorable conditions and make up for it by greater efforts.

On account of the finances of the Agricultural Society it was found necessary to cut down the premiums somewhat, but I am led to believe this reduction is only temporary and hope that the amounts offered will still be sufficient to recompense you in fair degree for the trouble you are put to in making an exhibit.

Let us show that our interest in our great pursuit is not altogether a mercenary one by taking hold and making the show of fruit this fall a worthy successor of the splendid exhibit of a year ago! Good will surely come of it, if we make an exhibit in this spirit, and the rightful demands of horticulture will be more readily and fully recognized.

I wish every fruit grower in the state would write me at once giving a full list of all the varieties of fruit they can furnish, and if any of the fruit will not keep well till the date of the meeting, arrangements will be made to place it in cold storage here without extra expense.

What have you got to help out the display? Let us take hold with a will! Yours fraternally,

Minneapolis, Minn., Aug. 1, 1895. WYMAN ELLIOT.

SETTING TREES LATE.—About four years ago we received from a distant nursery, a bundle of trees that had made such a start in leaf that we despaired of our ability to make them live. We did not, however, throw them away but carefully rubbed and picked off the shoots which had made the most growth, and leaving them nearly bare carefully set them in orchard. Upon making comparisons in the fall of that year we found that those late-set trees had made fully as good a growth as a hundred or more which were set much earlier, and today, they are as fine trees as any we have in orchard. Since that experience we have been much less careful to set trees when entirely dorment, and find, that, if all or nearly all of the foliage is removed and the roots guarded from exposure with extra care, there is little danger of loss. We moved three large trees of the Choke cherry this season when they had made a growth of nearly six inches and were in full bloom. They are now pushing out new growth and show every sign of making good trees.—*N. W. Agri.*

Secretary's Corner.

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FRUIT AT THE STATE FAIR.—The prospects for an exhibit of fruit at the coming state fair are not as flattering as we could wish, and we must make up for it this year by a little self-sacrifice and extra effort. On account of the connection of our esteemed fellow member, Mr. Wyman Elliot, with the fruit department, if for no other, we should make the necessary exertion to make our exhibit a success I have the personal assurance of Secretary Randall of the Agricultural Society that another year the fruit premium list will be put back where it ought to be, and certainly more will be gained in the end by coming out in force and keeping up the exhibit of our department with heartiness. We shall thereby increase our influence with the public and with the management, and all the sooner secure the just demands of horticulture.

Let us take hold with a will in this work.

Please note a communication from Mr. Elliot on another page in this number.

FRUIT EXHIBIT AT OUR NEXT WINTER MEETING.—Did you notice the article in reference to this subject on the last page of the July Horticulturist? If not, read it at once and put yourself in communication with this office. We want to make this a grand exhibit and need the co-operation of all the fruit growers to do so. Grapes and plums, as well as apples, may be stored for this purpose. Plums will keep till then, if packed while *hard*.

If not already received, apply to the secretary for shipping tags.

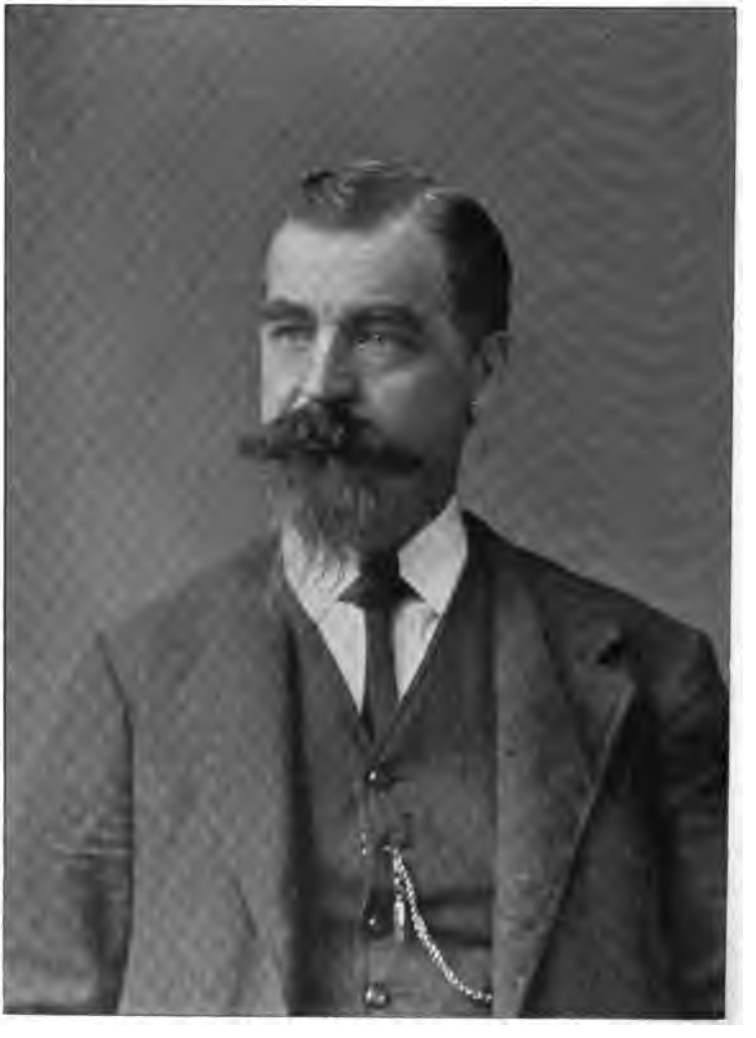
Arrangements have been made to store fruit with G. A. Dole's cold storage warehouse, 410 Washington Ave. N., Minneapolis.

NOMENCLATURE.—J. S. Harris is chairman of the committee on nomenclature for the Minnesota State Horticultural Society. He is engaged in making a "Catalogue and Fruit Album," of all varieties of fruit grown in the Northwest, and would be glad to receive typical specimens of seedling apples, native plums and any other new or unknown fruits, for examination. Address him at La Crescent, Minn.

NOTES AT LAKE CITY BY A. J. PHILIPS, SECRETARY,—"Friday, the 21st, I spent at Lake City on the grounds of the Jewell Nursery Co.; here the frost was light compared to many places in Wisconsin. Apples, especially Duchess, Wealthy and Okabena are bearing good crops; twenty thousand young plum trees in one plat, that have grown four feet from the ground this season, are a fine sight. They have grown so fast that all have had to be staked. Mr. Underwood has found a new plum in northern Minnesota that promises so well that I have taken the liberty to call it the Bonanza. It is the largest of wild plums and topworks readily on all plum stocks. Every graft they had put in seemed to be growing and very thrifty. If the quality is good it will be a valuable acquisition to the plum family.

Fifteen acres of apple trees for digging the coming fall are on their grounds. I am often asked for a variety of apples that will do well on sandy land. I always say I know of none, but I found the Okabena trees looking very well and bearing heavy on a very sandy hillside. This may be a valuable variety on sandy soil if not planted too far north.

Mr. Underwood has done what many other men in Minnesota and Wisconsin might do; he has cut off the timber on a high hill, some of it too steep to plow, and, digging a place like a terrace for each tree, has planted an orchard. The trees that are of the hardy varieties look healthy and a number are bearing this season, four years from planting. One hundred and fifty Northwestern Greenings are in the lot and look well. It was planted as an experimental orchard, consequently has too many varieties; one thousand Duchess, one thousand McMahon and one thousand Virginia for topworking are to be his next planting, which I consider wise. It will be some work to get the apples down the hill, but, he says, he will risk that if he can only grow them."



F. G. Gould.

EXCELSIOR, MINN.

An Honorary Life Member of the Minnesota State Horticultural Society and the present Treasurer.

THE MINNESOTA HORTICULTURIST.

VOL. 23 SEPTEMBER, 1895. NO. 8.

AN EXPERIMENT IN IRRIGATION.

PROF. E. S. GOFF, WIS. EXP. STATION.

As is well known, the strawberry plant quickly suffers from an insufficient water supply—an event which, in our climate, frequently occurs in June, the most critical time for the strawberry harvest. Rather late in the summer of 1893, arrangements were made for irrigating our small fruit grounds from Lake Mendota, to which they are adjacent, and in 1894 our strawberry beds were irrigated. A rotary pump, of a claimed capacity of fifty-five gallons per minute at one hundred revolutions, was connected by a three-inch suction pipe with the water of the lake, and a two and a half-inch discharge pipe was laid from the pump to the strawberry plantation, where it connected with a line of wood troughs that served to distribute the water to the different rows. The pump was operated by a ten horse-power threshing engine, though one of half this capacity might have done the work, The results of this experiment proved so satisfactory that it seemed well to describe it in some detail, not that the method is new but that the subject is one of great importance to the small fruit growers of Wisconsin.

The ideal ground for irrigation slopes regularly but very gently in two directions, though such land is by no means the only kind

FIG. 48.—Showing method of irrigating strawberries.

that may be successfully irrigated. The soil should be well cultivated at the beginning in order that the water may be readily absorbed by it, and the cultivator should be fitted with teeth that make a light furrow on each side of each row of plants.

This half-tone illustration will help the reader to understand many details of the work, as we performed it. The water falling from the distributing troughs in small streams flows slowly along the shallow furrows on either side of the strawberry rows, permeating the mellow soil as it proceeds and soaking in among the roots of the plants without puddling the surface, but leaving it more porous and permeable to air than after a rain. The attendant with his hoe directs the course of the streams as they need it, walking the while on dry ground.. There is no undue packing of the soil and no puddling of any part of it.

The distributing troughs are an important part of the outfit, hence these are described in detail. They are made of inch boards of common quality, which need not be dressed. As the bulk of water decreases in its forward movement through the troughs, those farthest from the supply may be made of narrower boards than the others. Our troughs are of two sizes, the larger being made of one twelve inch and one ten inch board, and the smaller of one ten inch and one eight inch board. The boards should be nailed together strictly at right angles, and cleats should be nailed across the top, one at the center and one near the ends of each trough, to keep the boards from spreading.

As will appear from the illustration, the end of one trough sets inside that of the next. Some trouble was experienced in preventing leakage at these unions, but generally a little dirt or a strip of building paper placed between the overlapping boards stopped the escape of water sufficiently at these points. The ends of the troughs are supported at the proper height by stakes driven in slanting and crosswise of each other; each of these stakes has a row of small auger holes through its center about three inches apart, so that by slipping an iron spike through the pair of stakes at the proper point they are readily joined together at the desired height. The stakes are driven into the ground sufficiently to prevent them from falling over sideways, and a tie strip, not shown in the illustration, should be pinned across from one stake to the other just at the surface of the ground to prevent the bottoms from spreading or from settling too far into the ground, as they are sometimes inclined to do after the soil becomes wet. This tie strip should have a row of small holes along the center like the stakes, to which it is attached with spikes.

The water flows from the troughs through three-quarter inch augur holes on one side, near the bottom and spaced three and a half feet apart. It is important that these outlets be under ready control, in order that the water may be evenly distributed to the different rows. This is accomplished by a little device made of two small pieces of thin galvanized iron. One has a three-quarter inch hole through it, half an inch from its lower edge, and the side edges are bent over so that the other, which has its upper edge bent for-

ward at a right angle to form a handle, may be slipped in and thus form a gate to shut off the hole more or less at will. This device is tacked with clout nails to the inside of the trough so that the hole exactly coincides with the one through the board that forms the side of the trough. If the attendant discovers that one row of strawberries is receiving more than its share of water, he partially closes the gate at the end of this row, and if another row is receiving too little, he opens its gate more. A sufficient length of trough should be used so that the holes can discharge all of the water delivered without being open to their full capacity.

We have found it more satisfactory to apply the water slowly over a large area at once, and thus give it ample time to soak into the ground, than to apply it faster over a small area. From ten to twelve hours of pumping were required to thoroughly wet the soil for one-fourth of an acre of strawberries, and the water generally came through the two and a half inch pipe under considerable pressure. This will convey some faint idea of the large amount of water required for irrigation in dry weather.

EFFECT OF IRRIGATION UPON THE YIELD.

Our strawberries were irrigated for the first time June 11, just as the fruit was beginning to ripen. At this time no rain had fallen since May 23, a period of eighteen days, and the plants were just beginning to show the effects of the drought. The plants immediately resumed their fresh and vigorous appearance and yielded a fine crop of excellent fruit. No further watering was needed until after the picking season, the drought having been relieved by rain on June 16. A portion of our strawberry plantation was left without irrigation as a check by which to judge the benefits received from irrigation. One plat of eighteen rows of Warfield and Wilson was irrigated on June 11. (These rows were also irrigated August 2 and 8, 1893.) A second plat of nine rows of the same varieties planted on the same day and with the same stock of plants, was not irrigated at any time. The rows were 50 feet long. Multiplying the yield of the rows not irrigated by two to make the area comparable, we have

18 rows irrigated yielded.....496.6 quarts
18 rows not irrigated yielded.....252.8 quarts

Difference in favor of irrigation.....243.8 quarts

The effects of the irrigation appear conspicuously from the accompanying graphic diagram. The difference in yield does not express the whole benefit from the irrigation, since the berries from the irrigated rows were decidedly larger than those from the rows not irrigated, which much enhanced their market value.

Irrigated.....

Not irrigated...

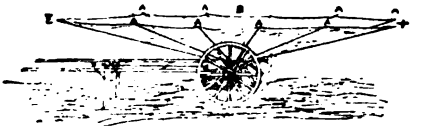
From the limited trials thus far made it would be difficult to accurately estimate the cost of irrigation. A fair estimate of the labor required would be three men, working one day, for each half acre irrigated. This includes the labor of running the engine, of setting up and removing the troughs and the distribution of the

water. The fuel and interest and wear and tear of pump, engine and fixtures must be added. There is no question that the irrigation of our strawberry grounds proved highly profitable, since the crop on other plantations in the neighborhood that were not irrigated proved nearly a failure.

After the berry harvest, the plantation looked so well that, though it had already borne two full crops, it was decided to mow and burn it over, thin out the plants in the rows and allow it to remain for a third crop as a further experiment in irrigation. Almost no rain fell until near the middle of September, and, with the exception of the check rows, the beds were thoroughly irrigated on July 12 and 16 and August 17. The plants made a most vigorous growth, and during the latter part of the summer, when the severe drought had destroyed nearly all green herbage, presented a most refreshing appearance, looking far more promising than spring set beds that had not been irrigated. The check rows, on the other hand, were nearly ruined—long vacant spaces appearing in some of the rows, where every plant had perished from the protracted drought.

A BUG MACHINE.

Mr. S. D. Willard, of Geneva, N. Y., herewith describes the "bug machine" which is used on his place in killing the curculio. It consists of an inverted umbrella-like contrivance made of sheeting, having a diameter of 9 to 11 feet. This is mounted on a two-wheeled wheelbarrow, and it having a slit in one side ending at the inverted apex, the man who operates it can readily push it under a tree until the trunk is in the centre. Then with a long, paddled stick, the operator strikes the limbs a quick blow and the curculios fall upon the sheet, and the wheelbarrow is moved on to the next tree. Just under the centre is a tin drawer into which the insects are brushed, and at the end of the rows the box is removed.



At point X two of the arms come near together, leaving a space, however, wide enough to pass the body of the tree between. The The dotted line under figure B represents the body of the tree when the machine is set for jarring. The distance across the sheet, for instance from E to X, is from 9 to 11 feet; in the machine here shown 9 feet. A represents the wooden arms that support the sheet, all diverging to *one centre* midway between the wheels, beneath which is a tin drawer that is pulled out to D, and the bugs dumped into a fire box and burned.

OUR WILD FLOWERS.

MISS SARA M. MANNING. LAKE CITY.

In the bright days after the April snows, we begin to notice the soft color of the budding willows, while out on sunny hillsides the grass is springing green, and the furry buds of Pasque-Flower are unfolding their delicate sepals of lavender and purple. These buds blossom almost as soon as they have ventured above ground, afterward the stem lengthens and the flowering fruit waves above a tuft of deeply-cleft leaves. At the same time in low ground the queer little brown and purple hoods of Swamp Cabbage, which cover a crowded mass of small flowers, are peeping out from the wet soil. Soon the little hoods fall to the ground and decay, the thick root-stock sends up a clump of heart-shaped leaves, broad and viny, surrounding a cluster of globular fruit. In April, too, comes the shy Spring Beauty (Claytonia Virginica) in moist open woods. The root is a tuber, the simple stem has two narrow opposite leaves and a small raceme of deeply-vined rose-colored flowers. Another dainty blossom is Harbinger of Spring (Erigenia bulbosa), which has white flowers in a leafy umbel. In rich woods is Bloodroot, so called from its root of orange red. When it comes up, the lobed leaf is rolled around the scape, which bears a single flower. The two flesh-colored sepals which enfold the bud fall when it expands, leaving the pure white petals a contrast to the golden stamens. Later a one-celled pod is all that is left of these little short-lived children of our shivering spring.

As the month nears its close, the drooping buds of Hepatica are forcing their way out from the tangle of their own green and crimson leaves of last year. Like several other species of our spring flowers, the leaves delay their appearing, sending the blossoms forward to spy out the land. As they come through the ground they are clothed all up and down their stems with a covering of silky fur, which falls off, and the flowers in tints of pink or blue open in the sunshine, soft green leaves appear with rounded or acute lobes, according to species, which, when the flowers are gone and only bunches of seed remain, grow long-stemmed, dark and glossy green, all summer showing where we may find these lovely blossoms another springtime. All about the roots of oak trees is Wood Anemone, its buds bent upon the surrounding involucre of leaves or the star-like blossoms looking upward. Rue-Anemone, its clustered tubers seeming to flourish on stony ground, waves its blushing blossoms and many leaflets about the brown lichened rocks, where mats of white Rock Cress cling firmly to their surface and purple stems of wiry Cliff Brake fill the crevices.

May comes with its freshness and promise, bringing flowers of many hues. The trees are putting on the tints of springtime—the bronze of the maples, the soft crimson of the young oaks, the ever varying shades of buff, grey and olive which come before the denser, darker foliage of a few weeks later. Beneath the trees Brake, Ostrich Fern and Flowering Fern are uncoiling, throwing off their light brown or green woolly coverings, preparing to grow tall and spreading, thus adding their graceful beauty to every woodland

scene, while on sheltered slopes of the bluffs more rare and fragile species will soon cover the mossy ledges. On their deeply-shaded bluffsides we find at this time the Canada Violet, which is a leafy-stemmed, white violet, the underside of the petals just tinged with purple; Decentia with finely cut leaves and slender stems of creamy hearts; wild Sarsaparilla spreading an umbrella-like leaf above its low greenish umbel; the creeping root-stock of Wild Ginger sending up here and there two broad leaves, underneath which the red-brown flower clings closely to the ground, as if wishing to escape notice. Small white spikes of Mitrewort and two-leaved Solomon's Seal grow upright among the moss. In less shaded spots are Baneberries with close racemes of white flowers. Our two species which resemble each other rather closely in blossom are quite distinct in fruit, one having bright red berries and the other waxy white.

Shooting-Star (Dodecatheon media) is a little wild thing of the Primrose family which always seems to have a startled air. To the same family belongs the dainty Star Flower (Trientalis Americana) found also at this time in the deep woods. Among bleak rocks gay Columbine nods in the face of the east wind. With it are early Meadow-Rue with many drooping leaflets and quivering stamens, and Bellwort with clasping lily-like leaves and pendulous flowers of pale yellow. Beside the little stream that twists and sparkles in the sun, the banks are golden with Marsh Marigold, while paler Buttercups (Ranunculus repens) creep over the ground by long runners. Where tall trees throw their shadows, downy yellow Violet hides its purple, striped flowers beneath its leaves, and Jack-in-the-Pulpit under its curving spaths stands close to the water. Here, too, are the two-edged leaves of Sweet Flag, its leaf-like scape bearing about midway the spadix of greenish flowers, also the sword-like leaves and variegated blossoms of larger Blue Flag. In some places the ground is covered with purple and white mottled leaves of Adder's Tongue (Erythronium Americanum), with its flowers light yellow. The closely related Dog's Tooth Violet, which has smaller flowers just touched with pink, is occasionally found; also beds of Gold Thread, known by fibrous orange roots, leaves of shining evergreen and one-flowered scapes.

Out on sunny hills, azure Larkspur sends several tall stocks from its strong roots, each terminating in a long racemè of spurred flowers, and wild Indigo (Baptisia leucophaea) hangs its large creamy clusters among its low-diverging branches. In sandy soil are light and dark blue flowers of wild Lupine, long-tubered, straw-colored flowers of narrow-leaved Gromwell (Lithospermum angustifolium) and golden Corydalis with blue-green foliage. As the month leaves us, the bell-like blue flowers of Greek Valerian are in the woods, light purple wild Cranesbill in the meadows, orange Puccoon in dry soil, white panicles of northern Bedstraw along the ridges, violet Wood Sorrel in plowed land, Strawberry blossoms flushing the hillsides and everywhere beautiful blue Violets sprinkling the grass.

June is the month of beauty, the month of the sweet wild Rose, which grows in fragrant jungles all up and down the hillsides, while many other beautiful shrubs blossoming at the same time

make scenes of wayside loveliness. Wild flowers now come with bewildering rapidity. Painted Cup makes itself known in the woods by an array of brilliant scarlet bracts, which hide the small flowers. Larger yellow Lady's Slipper is often found with it, and occasionally the smaller species (Cypripedium parviflorum), which has narrower and more pointed leaves and both petals and sepals more shaded with brown. Small white Lady's Slipper and showy Orchis are rare and delightful little plants of the same family. Green Orchis (Habenaria bracteata) grows among graceful Maidenhair Ferns, in damp ravines, and small two-leaved Orchis (Habenaria Hookeri) near mossy ledges where tender swaying Harebells are mingled with lace-like ferns. In partially shaded nooks is white Wake Robin surrounded by its whorl of three leaves. The petals flush to rose color a day or two after opening. Often parasitic on roots of trees are waxen Indian Pipes (Monotropa uniflora) which because of its ghastly appearance the Indians named the "Ghost Flower." The stems grow in clusters from a bunch of rootlets. The whole plant is a dead white, resembling a fungous growth, but it turns dark even with the most careful handling. Purple and white Vetchlings climb by their tendriled leaves upon the bushes of the hillsides, where also Hedge Bineweed trails and twines its long stems and Morning Glory-like flowers.

In cool shade are beds of Pyrola with rounded evergreen leaves and wax-like spikes of white flowers. Beside streams Solomon's Seal swings its rows of green bells beneath its fern-like stem, where at the same time are pink Waterleaf (Hydrophyllum Virginicum), blue Skullcap (Sentellaria versicolor), white feathery clusters of False Spikenard (Smilacina racemosa) and Marsh Bellwort too frail to stand clinging to the high grass. Among well-known plants of southern bluffsides and prairies are Butterfly Weed which grows in large clumps and is conspicuous because of its clustered umbels of brilliant orange, Ground Cherry, its drooping bells brown-centered, Meadow Parsnip with flat umbels of small yellow flowers, and Spiderwort in many shades of purple and blue. Flowering Spurge attracts attention by the petal-like involucre of white bracts, and Psoralea (Psoralea argophylla) by stems and leaves of silvery whiteness. Where the soil is richer are Sanicle (Sanicula Marylandica), which has greenish compound umbels, spreading mats of Seneca Snake root (Polygala Senega), tipped with white pointed spikes, beautiful wild Phlox and three-flowered Avens (Geum triflorum), a striking plant both in blossom and fruit. In June there are Fleabanes, Groundsel, Cane Flowers and a few other species of compositae, forerunners of the great host waiting to invade the land in late summer and autumn.

In July the scent of Clover blossoms fills the air. All the woodland paths begin to be obstructed by tangled undergrowth or shut in by Sumach bushes. Vines wander over shrubs or garland the trees making bowers of beauty. In ponds and water that flows softly are sweet-scented Water Lilies, which open their pure blossoms early in the morning, closing them again in the afternoon; at last the closed flower is drawn down to ripen the seed beneath

the surface. Very still water is covered with the leaves and bright blossoms of yellow Pond Lily. Bordering these ponds are Water Plantain (Alisma plantago), which has many small white flowers and broad cordate leaves, and Arrowhead (Sagittaria variabilis), so named from the form of the leaves; its white flowers are arranged in whorls of three around the stem.

In meadows above the high grasses are yellow Loosestrife, white umbels and large pinnate leaves of Meadow Parsnip, loose panicles of Swamp Saxifrago, rose-purple heads of Swamp Milkweed and Turk's-Cap Lily, its spotted sepals rolled backward. Half hidden in the grass are pale purple Gerardia, much deeper purple Mimulus and crimson heads of Milkwort (Polygala sanguinta). Early in July showy Lady's Slipper lifts its purple and white moccasins above the thick growth of ferns on our northern bluffsides. It has a coarse leafy stem but by far the prettiest flower of the genus. The tossing white sepals give them an alert look, as though they might suddenly fly away. With it we find orange-red Lily, Zygadene (Zygadenus elegans) with long grass-like leaves and graceful greenish sprays, and spreading Dogbane (Apocynum androsaemifolium), which has rich dark foliage and drooping rose-colored flowers striped with red.

Another choice plant is Grass Pink (Calopogon pulchellus); its flowers are beautifully bearded with white,purple and yellow hairs. Ladies' Tresses (Spiranthes Romanzoffiana) is a rare plant of the same family, which also has grassy leaves and small pure white flowers. One occasionally finds its haunts in some cool bog or ravine. The Pulse, Verbena, Figwort and Mint families add many species to July plants of woods and prairies, among which are pink and white Prairie Clovers, tall Vervains, Speedwell (Veronica Virginica), which has clustered white spikes, wild Bergamont, so noticeable all through the woods for its many flowers of light crimson, and wild Mint (Mentha Canadensis) with white balls in the axils of the fragrant leaves. An especially pretty plant which grows in thickets is Starry Campion (Silene stellata), the fringed petals showing at a glance that it is a member of the Pink family, as is also Catchfly with its sleepy flowers.

In August Sunflowers and the earlier Goldenrods and Asters are blooming on the edges of the wood and along the banks of the little stream that threads the woodland ways beside you, where are blue Lobelia, tall Bellwort, Grass of Parnassus, its petals striped with green, and Jewell-Weed (Impatiens fulva) grown into large bushes, hanging its irregular orange flowers against the dark foliage. Cardinal flower, shyest and showiest of our wild flowers, lights up the swamp lands where bushes bend to the breeze and Cat-Tail Flags grow erect and strong. Shallow pools are dotted with the white stars of Water Crowfoot (Ranunculus aquatilis, var. trichophyllus), whose leaves with thread-like divisions are beneath the surface. Water Polygonum (Polygonum amphibium) roots in the mud, and its bright pointed spikes grow upward through the water on which float the long-petioled, shining leaves. In springs are the spreading branches and bright blossoms of Monkey-Flower (Mimulus Jamesii),

also true Water-Cress, escaped from cultivation. False Dragonhead (Physostegia Virginiana) bends its wand-like stems and bright pink flowers where in the springtime the water overflowed. Here, too, are yellow Chrysanthum-like flowers of larger Bur-Marigold, (Bidens Chrysanthemoides). Carpet-Weed (Mollugo verticillata) forms round mats upon the sand, and Water Hemp (Acnidatuberculata) straggles over the gravel. The lake shore banks are at some points golden with Partridge Pea(Caesia chamaecrista)whose bright flowers have six purple and four yellow anthers. The leaves are sensitive. Toward the last of the month the throng of compositae rapidly increases. There are various species of Thistle, Blazing Star, Rosin-Weed, Rattlesnake-Root, Hawkweed, with Lettuce, Thoroughwort, Ironweed, Snakeweed, Boltomia, etc.

In September days there are Asters in all shades of lavender, pink, purple, crimson and white, and Goldenrods of many species, blossoming in royal profusion everywhere. The Fringed Gentian withers in the meadows where the leaves and ferns are all golden brown with autumn coloring, but we find the blue, closed Gentian, that flower which always seems in bud. The yellow Wood Sorrel, which began to blossom weeks before,is still clothed with its bright flowers. We detect a faint odor of Violets, like a memory of spring, and discover that it comes from the chocolate-brown clusters of Ground Nut, a late blossoming vine. Two other vines which blossom until late September and add to the tangle by the streams are one-seeded Bur-Cucumber and wild Balsam Apple. In the woods Pearly Everlasting (Anaphalis Margaritaceae) still keeps its fresh look among the great mass of plants gone to seed.

When October air lays chill over the autumn-tinted landscape, making the stretch of trees look shadowy in the distance, the whole country is gold and scarlet-russet and brown with the changing leaves. On bluffsides are a few later Asters and one last species of Goldenrod (Solidago latifolia.) The light blue five-flowered Gentian blossoms among the dark rocks, while in open woods the latest of our wild flowers, the Gentian (Gentiana proberula),which has petals so deeply blue, looks out from the frost-reddened leaves. In our late summer and autumn walks, instead of the bright blossoms which used to greet us, we find an interesting and bewildering array of ripened fruits and seeds and form an intimate acquaintance with burs of various kinds. We notice the bursting pods of the Milkweeds as the brown seeds with their tufts of silky hairs float away on the breeze like a colony of fairy balloons, or the Tumbleweed as it bounds over the prairie before the winds, knowing that these are a few of the many and wonderful ways provided for the dissemination of seeds.

In the white days of winter,we find the overarching branches bare or with the withered leaves of last year still clinging to them. It is then we learn to understand shrubs and trees better than when robed with leaves. We see the sturdiness and strength of the widely spreading Bur Oaks, the graceful outline of the Elms and how readily they bend to the blast, the ashy gray of the Poplars against the mottled hillside and the white gleam of the Birches.

Each tree and shrub has its own peculiar traits, and each may be recognized as an old friend of the summer time by its manner of growth or coloring.

"A year of time!
What pomp of rise and shut of day,
What hues wherewith our Northern clime
Makes autumn's dropping woodlands gay,
What airs out blown from ferny dells,
And clover bloom and sweetbrier smells,
What songs of brooks and birds, what fruits and flowers,
Green woods and moonlit snows, have in its round been ours."

THE FARMERS' INSTITUTE AS A METHOD OF TEACHING THE FARMERS HORTICULTURE.

(A DISCUSSION.)

Mr. Wm. Somerville: Mr. President; For a number of years I have been a member of the State Horticultural Society —since it first started—, and when we have met together from year to year we would talk over our successes, discouragements and disappointments, but it was always on the inside of our own circle, and we never had any method of getting it before the farmers of the state, until the farmers' institute was started. Now, the farmers really are the ones that need the teaching; they are entitled to it. We get appropriations, state appropriations, for our horticultural work, and we get state appropriations that the people have to pay for our institute work, and it is those who have to pay those appropriations that want and ought to know how and when to take care of trees, fruits, plants, etc. Those of us who meet together here from time to time get some information from each other, but the books that are published by the society containing our deliberations very rarely get outside of our own organization, hence, it is only a small percentage that get the needed information. Since the farmers' institutes have been started there has always been some person provided to represent the horticultural interest, and I claim that of all interests represented in the farmers' institute, that interest should stand first, because farmers know more about feeding their hogs corn and feeding the cows on their farms than they do about taking care of trees and raising small fruit on the farm. Hence, I hold that as fast as there is more teaching on this subject, many farmers will become interested in this matter.

I was with the farmers' institute for three or four years. I found this, that they were anxious to get all the knowledge

they could, and from what letters I have received from all over the state, wherever we have held an institute, in which they wanted to know how they were to take care of their small fruits, their forests and all of that kind of things, it has led me to believe that there has been more done directly in the raising of small fruits and setting out of trees in the last four years than has ever been done before in Minnesota. They also want warning; the country is full of agents from other states selling bogus trees, and these farmers want to be warned not to buy trees outside of the state. They ought to know it, and the only way to get the information to them is to continue telling them the danger they are in, and that if they get trees from outside the state, they will be a failure. Our trees have to be acclimated to our soil. If we go to the South for our trees, where the trees are growing under different condition and on different soil, and we plant those trees here, and the wood is not thoroughly ripened ready for winter, they will be a miserable failure, and we are retarding the cause of horticulture by doing so. We ought to do something to stop those outside agents from coming into our state and selling such trees, and the farmers ought to be notified to that effect. They are as thick all over our state now as the frogs were in Egypt, and through the farmers' institutes we can do a great deal to check those frauds.

I find our horticultural society has not taken interest enough to give Mr. Gregg the horticultural work that ought to go in his book. We have not given horticulture the space we ought to give it. For that reason all the papers on horticulture I have written for this society, I have given to Mr. Gregg to be published in that book. I claim that all interests ought to be represented. I am not here begging for the job, but I do claim there should be a representative of the horticultural interest in our farmers' institutes. The farmer is entitled to the knowledge and should have it.

M. Pearce: I think more good work all over the state can be done through the farmers' institutes than in any other way in which our horticultural society can work; at the same time I advocate something entirely different from what has ever been attempted in the farmers' institutes. I speak from experience. You take a building that is pretty well filled—two or three hundred persons present—and you will find that nearly all of them are directly interested in cattle, hogs, horses, wheat and such products, nearly every one of them; I may safely say nine out of every ten. As a rule, nine-tenths of the farmers attend farmers' institutes just for the purpose of hearing something about those subjects, and the moment you speak of

horticulture it falls on them like a wet blanket; over fifty per cent. don't want to hear anything about it. I have watched the thing just as carefully as I could,and I could see it on the countenance of every man present. There might be some fifteen or twenty horticulturists there, and their faces would glow with animation. I do not care who it is that may be speaking, if he knows that there are fifty or seventy-five per cent of those present who care nothing at all about what he says, pay no attention to it, he can have no courage at all to talk; he does not feel like it.

My suggestion is this, and if we will adopt it, we can do an immense amount of good. I want our institute work so far as horticulture is concerned held in a place by itself; I want all our strawberry growers there, our blackberry growers, every one who is at all interested in horticulture; I want all the horticulturists right there, and if it is properly conducted we can draw three hundred per cent. more there—if each one gets just what he wants, the cow man, the horse man, the sheep man, the wheat man; they are all interested in their work, and I claim it is better to give them separate instruction than to try to hold them all together. I do not care anything about a person who has no interest in horticulture—we want only those who are interested. If those men are educated right up to the work, they become enthusiastic, they spread over the country in different places, and they will do good work, and they will do an immense amount of good by demonstrating what they can do. Now, that is my system of teaching horticulture in our farmers' institutes. We will make thorough men out of some. We cannot do one-tenth justice to the interests of horticulture in the time we now have given us. We have thirty minutes. One-half the speakers cannot get started in that time. We want the forenoon and the afternoon. I think by following those suggestions we can do an immense amount of good.

Wm. Somerville: This institute work is a peculiar thing. You take the cow interest; you can send a man all over this country to talk cow, and you can hardly get a corporal's guard out. You take the hog interest, and get as good a man as Theodore Louis to talk about it, and you can hardly get a corporal's guard out. You take horticulture and undertake to run that interest by itself, and you can get still less out to hear it. You must give them a variety of things. So far as time is concerned, I have never been allowed less than one and a half hours; I would talk horticulture, and it would not throw a wet blanket over the people. If you are interested yourself, you will get along all right, and you will get the crowd to listen to you, and you will get them interested enough so they will inquire about horticulture.

Mr. E. H. S. Dartt: I think I have been imposed upon a little this morning. My friend over there has been stealing my thunder talking about fools. He said there were seventy-five per cent of the people at farmers' institutes who paid no attention to us. I have had a little practice in that line. In order not to do that, I think when we get up and look a little wise and know about what we are talking, we should deal out our wisdom in small doses to suit the capacity of the audience to digest what we give out. There is an-

other danger; if we deal it out in large doses, if we undertake to cover the whole question, we will be liable to exhaust our stock of knowledge, and there would be nothing left of us.

Pres. Underwood: I would like to say a few words on this subject. By virtue of my office as president of this society I am one of the directors of the farmers' institute. A number of our members have spoken to me about the farmers' institute, and have asked me, "What is Mr. Gregg doing, and how is the horticultural interest being represented?" and I did not feel as though I knew anything about it, so I wrote a lot of letters to different parts of the state and talked with Mr. Gregg in order to get myself more directly in line with the work. While I think of it, I want to say that there is a great deal of force in what Mr. Dartt has said, that people's minds can contain only so much. I think it is like listening to a speech or sermon; when the mind becomes full it does not retain any more, and the speaker might as well stop. You fill a pail full, and you cannot make it hold any more. I think, as friend Dartt has said, you do not want to give the subject too much time. As Mr. Somerville says, you cannot successfully conduct a farmers' institute without having the different branches of horticulture, agriculture, dairying and the farm interests represented. I am certain that it has to be conducted on that line in order that it may be a success. Mr. Gregg has made a success of it, and all we want to do is to be prepared to present our interests in the best manner possible and in the time that is alloted of us.

These institutes have to be conducted like an entertainment. You call together a great lot of people, some hog men, some horsemen, some cattle men, dairymen, beekeepers and those representing other interests—and in order to make a success of an institute, you must have these various interests represented—, and you want a shrewd, sharp, witty, intellectual man, in fact, you want all of those qualities combined in a man in order to stand up before an audience and hold their attention and make a success of it. All I want to say is, that as a representative of this horticultural society, if any of the members can suggest anything to me whereby I may, with any influence I may have by virtue of my office, further the interests of horticulture, I shall be glad to have you do so. I shall be glad to have you talk with me or correspond with me in regard to this matter as how to best develop our interests in the farmers' institutes. That is what Mr. Gregg wants. Be prepared to suggest things, to hold up his hands, and if we have our minds upon this matter, we can do so. In corresponding with the various members of the society, they have invariably expressed themselves as being satisfied with the work that was being done, and had no suggestions to offer as to what was needed. I can assure you that during the next year, if we have a mind to—and let us all try to do it—we can greatly advance our horticultural interest in the institute work.

Mr. Bush: I met Dr. Curryer the other day; he was in our village to arrange for an institute, and we shall have three or four halls, and we shall try to bunch our horticultural interests, and dairy interests and others in each of those halls. The dairy interests will have a hall

by itself, and the same with the other interests. It is a somewhat different departure from the work as it has been usually conducted, but I think it is going to be a grand success.

Mr. Dartt: I did not understand what question was being discussed, and if I made any remarks that were out of the way its "fools for luck." (Laughter.)

S. D. Richardson: I would like to ask the gentlemen who has just sat down what he is going to do with an all-around man, a man who is interested the horse, cow, sheep, hog and horticulture, what is he going to do with such a man?

Mr. Bush: He would be on the road most of the time. (Laughter.)

Mr. Somerville: I will answer you in that particular. Where we occupy two halls it has been like this. I would talk at one hall and as soon as my time was out at that place I would go to the other hall, and the other man would come to the first hall and tell his story, and in that way they all heard our stories and were interested. I am aware there will be quite an interest expressed in horticulture where Mr. Bush lives, and there ought to be some person there to represent it; that is my neighborhood, and it is said "No prophet is without honor save in his own country."

Dr. M. M. Frisselle: I want to say a word or two about this farmers' institute business. I quite subscribe to what Mr. Somerville has said, still I think there are one or two other points which might be brought out in connection with it. Mr. Gregg is a very able man in this work, and he has done a very grand work throughout the state. I have attended a good many of the institutes, and I know from the interest manifested in the instruction given that it was profitable, and the plan that has always been pursued at the various institutes of holding the meeting in the same hall and having the different interests combined is an excellent one. The audience likes a change. It is like going out to dinner; we do not like roast beef all the time, and we don't like coffee to drink all the time. Where a man speaks twenty to thirty minutes on horticulture, another on hogs or on the dairy industry, the people like it better, and they really get more good out of it than if two hours were spent in discussing one branch.

Here is a point in which we might make an improvement: Our state is a very large state; the interest in these farmers' institutes is largely increasing. It is surprising how the people come for those books that are published. Every man that comes to the institute gets one of those volumes. Any volume is worth a dollar, and they come long distances on purpose to get this book; and while they get this book they get a good deal of other information, and this book and this information should be more widely disseminated throughout our state. I had the fortune (misfortune to the people, I think,) to be out a couple of weeks with the institute corps, and I know people who came twenty miles to attend the farmers' institute, and some farmers came that distance and went back the same night in weather as cold as it is today. I do not think I should want to go quite as far as that in weather like this. In this large state of eighty counties or more, and with only one corps of institute workers, it is

accessible to only a few, comparatively. You cannot reach all the people with only one corps, you cannot do it. These institutes that are held in various places will go there this year, and then it will be two or three years before they will have another institute; they want it to come every year; once in two or three years is not enough. In order to give the people what they want and what they need, it seems to me it would be advisable to put more than one corps of workers in the field. Divide the state into two parts; two corps would work just as well as one. In Wisconsin they have four corps, and I understand they are carried on very successfully indeed. Our people pay the bills, and who is to be benefitted? The people ought to be benefitted. We think we can afford to build a four or five million dollar courthouse in Minneapolis, and the people pay the bills. This is a large subject. I think the people ought to have some benefit from the taxation; I think they ought to have more than they have now, and I do not know how it can be better given to them than through the farmers' institute work.

FORESTRY.

REV. O. A. TH. SOLEM, HALSTED.

The intelligent observer who to a limited extent understands the important significance to our country and our people, both for the present and future, of protecting our forests and the vigorous efforts being made to promote the advancement of timber culture, cannot refrain from rejoicing over every little attempt made in that direction. The great and commendable work done by our society in constantly agitating the matter cannot be overestimated, and the interest taken in the progressive work in bringing its importance before the people is really worthy of highest commendation. The press to some extent, especially so in the larger cities, have aided us very much in our work, and the co-operation of our local country papers has been of great value to our society and the furtherance of the grand object we seek to attain.

The terrific forest fires of the previous year have opened the eyes of many to the stern necessity of immediate action, with a view to protecting our forests from the many enemies that threated to destroy it. We hope that every owner of a tract of land, however small, will proceed at once to plant a few trees thereon.

It affords us great pleasure to be able to state that last spring there were a goodly number of trees set out in this vicinity, and, to judge from the interest manifested the past year, tree culture will assume marvelous proportions with the advent of the approaching spring. The people now are desirous of knowing what varieties to plant and how to treat them. Quite a number of people have obtained trees from my nursery, and when occasionally I stroll around the settlement, these trees, rank and robust in appearance seemingly, as it were, gracefully and politely greet me as I pass with the warmth and ardor of old acquaintances. At some places

do these stately and thrifty trees in their virgin splendor, as it were, speak to me, saying: "I have received good and kind treatment in accordance with your instructions to my nurse and proprietor when I left you;" others invariably say: "Here I stand isolated and parched, the soil so hard and baked that my roots cannot spread and work their way through, and the weeds robbing me of every drop of water that the gentle showers lavish upon me in a bountiful measure, could I but retain it. The cattle are allowed to roam over my inheritance, treading me down, and I feel so overcome and despondent that death would be a relief; therefore, I long to die. I have desired so much to perform my mission in this world, but have been given no opportunity, and my owner, by whom I was adopted, must be held responsible for the result."

When my friends convey such a sprig to the place where they desire to plant it and I happen to behold its neglectful appearance, I procure a spade and a wheelbarrow by which to transport loose pulverized earth, chips or mulch, to be placed around it, and next time that I come around the very same trees exhibit a prosperous, healthy and contented appearance.

Formerly the standard rule was to plant cottonwood, now it is my honest conviction that it is injurious for many reasons to plant any of that kind. People are now beginning to plant trees of the varieties found in our native timber belts here, and where secured by careful selection they seemingly do well; others gather seeds and plant them where they desire to have them stand in the future. The tree agents have no longer the harvest they were accustomed to gather by their immense sales of cottonwood trees. This I call a happy sign.

One thing that has destroyed our forests to an alarming extent is the foolish and absurd practice of converting timber lands into pasturage. Cattle, horses and sheep destroy the young timber, each in their own peculiar way. The thoughtful farmer cannot afford to have his trees destroyed in that way. Here is ample material for the "press" and it should not hesitate, promptly and without reserve, to show up the disastrous results from the destruction of our forests, repeating it at intervals and never letting up until the people are convinced that it will not do to allow our forests to be ruined, isolated and destroyed. Hon. S. M. Owen, it is to be hoped will be present at our gathering. This report is in the main addressed to him, and other representatives of the "press" that will permit their papers to serve the people and our country.

Now "What variety of trees shall I plant?" is a question that naturally arises. Formerly, when a person planted a certain variety and that particular kind had a tendency to thrive and do well, the people were not slow to follow suit; they must invariably plant the same variety or not at all. Others cling to the belief that they must plant the same kind of trees that they were accustomed to plant where they formerly lived, for instance, cottonwood trees; they do not seem to have any regard for climate, latitude or soil, and still less for the variety most needed in the future.

The prodigy confronts us then, that where the venture has been made at tree planting we will find the same variety over the entire settlement, and every grove of timber is exclusively of one variety.

I need not mention the injudiciousness thereof from a pecuniary standpoint. How a lover of nature must feel at such unnatural arrangement! Nature should be imitated here, also.

The next question that arises is, how shall I proceed to plant the different varieties of trees? In this connection I will say, in a way that is by no means a new way, but on the contrary, and that, I believe, has great significance where the winters are long and cold, and where we suffer from drought—plant the seed and when superfluous trees spring up, thin them out later on. When we undertake to move trees, the tender and otherwise delicate roots are more or less injured, and by transplanting the natural line of the roots is disturbed, resulting in injury to the future growth, thriftiness and hardiness of the trees.

When the germ sprouts, the roots form first and grow outward several feet, as the tree requires it. What importance or significance this has in severe drought is easily understood and explained and is of equal, if not more, importance when coming in contact with severe cold. While the roots of the transplanted trees are solidly frozen, the roots of those grown from seed extend to dry earth.

Would it not be considered immodest, I would desire to ask, if any one has tried the experiment of planting the seed from the hardy varieties of apple trees in places where trees would grow, thrive and be expected to bear fruit, and also the grafting process, to ascertain what influence the same would have on the thriftiness and hardiness of the trees, etc. I have been unable to find any report on this experiment.

My different varieties of evergreen and deciduous trees have in but few instances failed of the desired results.

In my former report I made mention of the European birch as a tree of great promise. It has greatly exceeded my expectations, and our soil seems to be adapted to it, as it grows rapidly and seems to be very hardy. I arrange these trees in rows between the evergreens as a pleasant and agreeable contrast to the verdant attire of the evergreens.

Norway spruce and Scotch pine grow rapidly, but our old trusted and tried natives, such as white pine and spruce may prove to be the safest in the end; white pine seems to do remarkably well here.

To our horticultural friends, I will say that I raised a considerable quantity of small fruit last summer. Could you have seen what Victoria and Prince Albert was capable of producing in the family of currants, and, especially, Hansell and Cuthbert in the raspberry family, you certainly would have admitted that wheat alone is not the only product that can be raised here. Mrs. Solem very much doubts that any one living west of Minneapolis can exhibit a fruit pantry so rich and rare as the one that she owns and controls. It is not in the summer only that fruit is delicious and relished.

Now, a word to our bee friends. I had a hive that swarmed, and, consequently, two was formed of one. Of the first one I took out ninety-six pounds of honey, and from the second forty pounds From this it will be readily seen that the Red river valley may be in time equally as celebrated and renowned on account of its production of fruit and honey as it formerly has been for its production of wheat.

A FARMER'S GARDEN.

Fruits and Vegetables.

WM. SOMERVILLE, VIOLA.

We should have one acre set apart for that purpose well enriched and as near the house as possible for convenience, and we should have it plowed in the fall. When the ground is dry enough to cultivate, we should thoroughly drag and then take a half day for garden work.

First, we want to plant some lettuce, some onions, some peas, also some potatoes; as light frosts do not injure these, we can plant early. I think it always best to plant in drills, as it is easier to cultivate.

An asparagus bed is needed also. We can buy the plants very reasonably, or, if we want to grow from seed, we can do that by putting the seeds in a box, the same as we do cabbage, in the house. Then, in early spring when the plants are large enough to set out, it is best to set them in rows and grow them one year; then prepare the ground the next year, say, a rod square, manure heavily and then, with a spade, dig it all over at least a foot deep, thoroughly mixing the manure as you spade. Set the plants one foot apart each way, putting the crown three inches below the surface. The first summer cultivate with shallow cultivation, keeping all grass and weeds out; then, in the fall cover all over two or three inches deep with well rotted manure; then, the next spring sow one quart of salt, as the salt has a tendency to improve the growth of the plant and at the same time it stops the germinating powers of the weed seeds. Asparagus should be in every farmer's garden, as all it wants from year to year is a little more manure and a little more salt. It is the first of garden products in the spring, and you can keep cutting it to the first of July and do no harm; and there is no piece of ground on the farm of the same size that will give the same amount of food.

When we think the frosts are past, we want to set out our cabbage and tomatoes. When the ground has been well prepared and enriched, take the garden line and stretch across the garden and set cabbage plants two feet apart along the line; then move the line three feet and set another row, if necessary, for late cabbage. For winter use it is best not to set so early, as they have too long a season to grow and frequently the heads will burst. To prevent or kill the cabbage worm, road dust or salt will some times be sufficient, but this summer I had to apply hot water two or three times, before I got rid of them. For tomatoes the rows should be four feet apart and four feet between the plants.

Everything in a garden should be put in rows, so it can be cultivated with a horse. Cultivate shallow and often, and a crop is certain.

Next, we want our beans, radishes, carrots, parsnips and beets; these also should be planted in rows, so as to be cultivated as much as possible with a horse.

Then we want our small fruits. Where we want to plant our strawberries, it is well to let no weeds go to seed the year before we want to use it; then, in the fall manure well with well rotted manure and plow under; then, as soon as the ground is in condition to work, drag it until you get it in good shape. Now, you want good. healthy plants, and you do not want the roots long exposed to the sun, and not too many varieties—four or five varieties are plenty for any farmer's garden. Of the tried varieties I think the following are as good as any: Warfield, Crescent, Haverland, Wilson and Captain Jack. Plant these, first a row of Crescents, then a row of Wilson, then a row of Warfield, then Captain Jack, then the Haverland.

When you are ready for planting, if there are any dry leaves on the plants, take them off; and if the roots are too long, cut off to four inches; put them in a pan of water; then stretch the line across the garden and with a spade open the ground, separate the roots and put down the plant where you have opened the ground with the spade, leaving the crown even with the surface. Set them fifteen inches apart along the row. Then move the line four feet and set out the next row the same, making the rows four feet apart and fifteen inches between the plants. Then you want to cultivate through the summer frequently and keep down all grass and weeds. Do not let them fruit the first summer, but pull the blossoms off in July. When they throw out runners turn them along the row, so you will have what nurserymen call a matted row. When the ground freezes, cover them in that condition till spring. Do not take the covering off too soon in the spring, so that you may escape the early frost that might kill the bloom and cause you to lose a crop. Take it off carefully and leave it between the rows, so as to retain the moisture they so much need in fruiting.

When you have picked the fruit, take a scythe and mow the bed off clean and take the mulch and all and put in a compact pile or burn up. Then take a plow and turn a furrow each way from the rows, leaving fifteen inches standing in the row. Do not leave these furrows open long but with a cultivator or shovel plow level the ridge down, keeping always as level a surface as possible. When the ground freezes cover for another crop. The next spring set a new bed.

Next, we want our gooseberries. We do not want them set too close together, we want to set them at least five feet apart so that they can have a free circulation of air for they are subject to mildew. For a good fruit I know of none better than the Houghton seedling or Downing. Leached ashes are a good fertilizer and also good to destroy insects.

Then we want our currant bushes, and we want them set in rows so that we can cultivate them. We want the rows six feet apart and six feet between the bushes in the row, giving a free circulation of air and not allowing them to grow too thick. Keep the old stock cut out, as the new wood bears more and larger fruit. Keep them well mulched with leached ashes and cultivate well, and you are sure of a crop. The currant worm is the worst enemy the fruit has, yet they are easily destroyed by mixing a tablespoonful of white

hellebore in four gallons of water and with a garden sprinkler spraying it over the bushes; in ten days repeat, and generally the end is accomplished. Do this when first discovered. As for varieties, there are a number of them. The Red and the White Dutch are as good as any; the Victoria and the Long Bunch Holland are also good. The White Grape is the most reliable white currant I know of for family use, but is not so good for market, not having the right color. The Fay's Prolific has large fruit but is a shy bearer, and I do not believe it is adapted to our climate.

The Lake City nursery sent me a new variety called the North Star, that has fruited with me; it appears to be an improvement on the old varieties. The fruit is a bright red, large and not as acid as the old varieties, and from appearance in growth of wood and fruit will become a valuable accession to our list of small fruits.

Next, we must have our raspberries. There is no small fruit so certain of a crop, and which pays so well for the labor given as does this fruit. It scarcely ever gets injured by frosts, as the fruit comes on the new growth of wood. We want the ground well prepared. It is best to plow in the fall; then as soon as the ground is in condition, drag it till you get it pulverized. Have your sets ready; take one horse and a plow and run furrows nine feet apart, or take the garden line and stretch it on the ground and set them five feet apart; then, if you wish, you can plant any hoed crop, i. e. potatoes, cabbage or anything but corn, so that you need not waste the ground. *Cultivate well.*

The next spring, set your posts and stretch your wire (common fence posts are the best). Commence at one end of the row and set two post eighteen inches apart, then go one and a half rods, and so on to the end of the row, leaving the fruit row between the posts. Then, using common, smooth fence wire, put two wires, one two feet from the ground, the other four, which leaves eighteen inches between the posts. Then take the team and wagon and draw mulch, wet straw or coarse stable manure, and fill in between the rows four or five inches deep. It keeps down the weeds and grass and retains the moisture in the ground for the benefit of the fruit when it needs it most.

The advantage of making the rows so far apart is this: you can in the spring drive between the rows with your wagon with mulch to put between the rows, and, if the rows were closer together, it would have to be accomplished with a wheelbarrow if done at all, and land is cheaper than labor. Mulching saves cultivation and is better, because it stops evaporation, keeps the ground cool and retains the moisture better than cultivation; also, keeps down all grass and weeds.

Varieties of red raspberries. The Turner is the hardiest and will stand more freezing with less injury than any other variety I know of. The fruit is medium in size and good in flavor. The Cuthbert is also a good variety; fruit larger than the Turner and a better market berry. Marlboro is also a very productive fruit, large, and bright red, and a vigorous grower. The Golden Queen fruit is large, of a fine flavor and bright yellow in color, very prolific, but kills back

badly if not laid down and covered up. The Caroline is also a yellow berry, of good size and quality, hardier than the Yellow Queen for family use. I think Shafer's Collosal is first choice. The fruit is large, purple in color; not a good market berry, it being soft and the color not favorable. It is a hybrid between the blackcap and the red, and has to be propagated from the tips the same as blackcaps.

For blackcaps, the Ohio is a vigorous grower, fruit large and shining black, of a fine flavor; a good market berry. Souhegan, highly recommended, but I have none. The Gregg is a good variety. The Tyler bears fruit not so large as the Ohio, but earlier.

Now for their care after fruiting. I believe, in any exposed location, it pays to cover them up in winter. You get more fruit, and there is more vitality in the canes to mature their crop. All canes will kill back more or less in the winter unless covered. Yet there are favorable locations where the snow will drift in and partially cover, and then I do not believe it pays to cover every winter. In covering, it is best to remove all old canes out of the hill, leaving but five or six canes in a hill, then burn what you have cut off, so destroying any insects that may have been in the old canes. Commence at the end of the row and take some ground away from the side you want to lay them down; then go to the other side of hill, putting your foot near the roots of the cane and your spade under the hill. They are easily bent down. Then to the next hill, laying the tops of one hill to the roots of the other, till you get your rows laid down, just putting dirt on the tops to hold them down; then you can cover with mulch or dirt, and the work is finished. The next spring you can uncover, commencing at the other end from where you began laying them down. Raise them with a fork.

Through the summer, when the young canes are growing, they should never be allowed to get more than five feet high before cutting the tops off. They will throw out laterals and produce more fruit for the cutting.

DISCUSSION.

Wm. Somerville: Mr. President, I have taken some pains in writing this paper, not directly for this organization, but for the benefit of the farmers in general, and I have given the paper I was to have read here to Mr. Gregg to be published in his book, which is published and issued annually for the benefit of the farmer. I do not know that the paper would be practical for the commercial gardener, but it is made up from my experience as a farmer, in my own garden, at my home, where I try to make everything as pleasant as I can. I wrote this paper on that principle, not particularly for those who are here, but for the benefit of those who are not here to take part in our deliberations. I look at this matter as though the farmers were entitled to all the knowledge that we can give them. We come together here from all parts of the state, and we talk these things over among ourselves, but there is such a

small percentage of the farmers that have the advantage of our knowledge that it is necessary, and highly necessary, that they *should* have it, and for that reason I gave this paper to Mr. Gregg to be published in his book. I have also another paper which I will hand over to the honorable secretary, and if he sees fit to put it in his report, all right.

I have long ceased to look to the heavens for rain, but have tried to utilize the snow in the winter and the rain in the spring to the best advantage I could. I have done this by thorough cultivation, forming a dust blanket, a dust mulch, in my garden where I could not use mulching conveniently, and where I can use mulching heavily, as I do on my small fruits, I hardly ever suffer from drouth. Even this last year, our small fruit crop was abundant; I never had any better—but every one who is engaged in commercial fruit growing cannot do this. But I, living on the farm, have the advantage of wet straw which I put around my berries, currant bushes and everything of that kind, and in that way I retain the moisture that the ground so much needs in a dry season.

Pres. Underwood: These papers on vegetables are now open for discussion.

Mr. Elliot: I thought each paper was to be discussed. There was one point brought out in regard to black streak in Ohio potatoes; I will ask Prof. Green to give us his theory in regard to that.

Prof. Green: I want to say right here that I do not know what causes it. It is probably some fungus disease. I wrote some months ago to Prof. Galloway and I asked him what he knew about it. He replied saying he had received specimens, one from France and one from England, and he asked that I send him specimens, and I sent them on. We have not as yet any definite information as to the causes of that disease. Prof. Galloway will make a very full investigation the coming year. I do not know that all here are acquainted with that disease. You cannot tell that the potato is diseased from the appearance of the outside; the outside looks just as good as it ever did. When the diseased potatoes are cut open the centers are found to be black, and of some lots of Early Ohio which have been examined, 100 per cent. were black-hearted. This is not the old fashioned black-heart with a swelling in the center, and the potato does not shrink inside. As to how general this disease is, I will only say that we had forty varieties of potatoes tested at the experiment station, and there were very

few specimens that did not have this dark spot in the center, and in quite a number of cases it ran up to 100 per cent.

Mr. Brand: What were those specimens?

Prof. Green: I cannot tell just now, but it will appear in our bulletin. There were forty-two varieties opened the other day.

Mr. Harris: I think there was one error in the paper on sweet potatoes, and that was in regard to securing your seed potatoes from the South instead of states nearer by. For twenty-five or thirty years I was in the business of growing sweet potatoes for market and selling plants, and I found that the further north I could go for ripe potatoes the better it was for seed, and for more than twenty years of that time I kept potatoes for seed that were brought from the South as much as thirty-five years ago. They appeared to come earlier as the years went on. I think it is safe to say that the further south you get your potatoes for seed, the longer it will take them to mature.

Dr. Frisselle: I would recommend going further north for potato seed.

Mr. Harris: I would not recommend going further south for seed anyway.

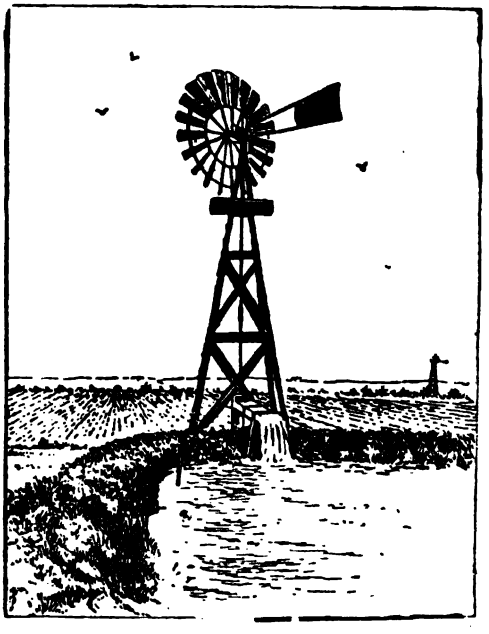
Dr. Frisselle: They ship large quantities of seed potatoes from the northern part of the state into Missouri.

THE CHOKE CHERRY AS A LAWN TREE.—Many of our planters who have moderate sized lawns make the mistake of planting too large a proportion of the large growing forest trees, and neglecting those handsome shrubs and smaller trees which would allow more room for expression and effect. Among this class, there is none more graceful or desirable than our native choke cherry. Its foliage is peculiarly rich, always healthy and comes out among the very first in the spring; and both when covered with its fragrant white blossoms and when drooping with its load of shining red and black fruit, is a very noticeable tree on any lawn. Some years ago while making an excursion into the country, we came across one of these cherries in the back yard of a farmhouse. It lingers in our memory as one of the rare beauties of nature. The tree was about sixteen feet high, of perfect form and habit and at that time most gracefully hung with strings of shining coral. The wild black cherry, the red cherry and the choke cherry are all very satisfactory ornamental trees and within the reach of everybody.

MAKING A RESERVOIR FOR WINDMILL IRRIGATION.

(Selected.)

Wind pump irrigation will be depended upon more and more wherever the rainfall is apt to be deficient. The accompanying illustration, taken from a photograph, represents a section of one of the many reservoirs in Mead County in southwest Kansas which have been used satisfactorily for some time. The pump is larger than the average in this locality, having a 12-inch cylinder, a 12-inch discharge pipe and a 10-inch stroke; it lifts the water 14 feet at the rate of 175 gallons per minute.



The preparation of the reservoir is most important, and in order to assist any who contemplate such an addition to their farm improvements, I will tell how I made mine. Select a site higher than the ground to be watered. Lay out the reservoir corresponding in capacity to the power of the pump. The pump must be capable of filling it in two or three days. Remove all sod, placing it beyond the limits of the walls. Do not use it in forming the embankment. Then plow and scrape, dumping where the wall of the reservoir is wanted. Continue until the work is completed, driving over the wall. Leave the inside sloping so the waves will not injure it. When the excavation is of the desired size, plow the bottom and pulverize thoroughly. Hitch a team to a block, road scraper or other suitable object, turn in the water and begin to puddle by driving along one edge and continuing until the whole surface is puddled. This will cause a precipitation of sediment which will fill the pores of the soil and enable it to hold water quite well. The bottom will then be 12 to 18 inches lower than the surface of the ground outside, but that much water must always be left in the reservoir to preserve the puddling, for if it gets dry or freezes the work must be done over again. If the reservoir is small, say 30 x 50 x 3 feet, some dirt for the wall must be obtained from the outside. An outlet can be made of four 2-inch planks long enough to reach through the wall. Saw the inner edge sloping and provide it with a valve made of 2-inch board, and on the same principle as the valve in an ordinary pump.—American Agriculturist.

BIRDS HELP THE FARMER.

[Selected.]

Dr. C. Hart Merriam, chief of the division of ornithology of the agricultural department, has been for several years engaged in examining and analyzing the contents of the stomachs of hawks, owls, crows, blackbirds and other birds of North America which are supposed to be strikingly beneficial or injurious to the crops of farmers. The stomachs of over 7,000 birds taken at different seasons of the year have been already analyzed and the contents determined, while some 12,000 are still unexamined. The results in some cases have been remarkable, showing in several notable instances that the popular ideas regarding the injurious effects of certain birds were wholly mistaken ones, and that they have been the victims of an unjust persecution. This has been found to be especially the case with hawks and owls, for the slaughter of which many states give bounties. Pennsylvania in two years gave over $100,000 in hawk and owl bounties. Examinations of the stomachs of these birds prove that 95 per cent. of their food was field mice, grasshoppers, crickets, etc., which were infinitely more injurious to farm crops than they. It was found that only five kinds of hawks and owls ever touched poultry and, then, only to a very limited extent. A bulletin now going to the press on the crow also shows that bird not so black as he has been painted by farmers. The charges against the crow were that he destroyed the eggs of poultry and wild birds. Examinations of their stomachs show that they eat noxious insects and animals, and that, although 25 per cent. of their food is corn, it is mostly waste corn picked up in the fall and winter.

With regard to eggs, it was found that the shells were eaten to a very limited extent for the lime. They eat ants, beetles, caterpillars, bugs, flies, etc., which do much damage. Cuckoos and other blackbirds, kingbirds, meadow larks, cedar birds, thrushes, catbirds, sparrows, etc., are also being reviewed in the bulletins. In many cases popular ideas are found to be untrue. In the case of the kingbird, killed by the farmer under the impression that it eats bees, it was found that he ate only drones and robber flies which themselves feed on bees and which destroy more bees in a day than the kingbird does in a year. The kingbird, therefore, is to be encouraged rather than slaughtered. The cuckoos are also found to be very useful birds in this country. Because the European cuckoo robbed nests and laid therein its own eggs, popular fancy attributed the same vicious habit to our own cuckoo. He is, however, not depraved like his European namesake, but a very decent fellow who does much good in the destruction of insects. The result of this work, Dr. Merriam says, will inure to the protection of beneficial birds and the destruction of the injurious ones.

Dr. Merriam is also preparing a map showing the life zones of the United States for birds, reptiles and plants, a work on which he has been engaged for years.

ARBOR DAY.

HON. C. M. LORING, MINNEAPOLIS.

An address delivered before the South Minneapolis High School, Arbor Day, 1895.

Students of the South Side High School:—I am glad to be with you this morning. It always makes me feel as if I were a boy again to be with young people, and I have no pleasure equal to that of seeing them enjoy themselves. Some one has said that we are not as old as we look, but only as old as we feel. That being true, I am as young as you. On one of my voyages on an ocean steamer one of my fellow passengers was a gentleman apparently about 70 years of age, who was so active and energetic in getting up entertainments to amuse the company that he soon got to be looked upon as the youngest man in the cabin, and he made us feel young by introducing games and plays usually indulged in by young people. I asked him one day how he retained his youthful spirits. His reply was: "How could I help it? I have eighteen daughters who have kept me young."

I was invited here today to talk about trees and not about young people, but as I associate them together in my mind and have the same sentiments for both, it seems quite as natural for me to talk of one as of the other.

I think, the first tree I remember much about was the birch. You will remember that King Solomon said that to spare the rod was to spoil the child, and as the bible was read in the schools in the good old days when I was a boy, the teachers seemed to have that passage very firmly impressed upon their minds, and the birch tree was the one from which the rods were cut which saved us from being spoiled. Naturally, you would say that kind of association with trees would not make us love them very much, but we soon learned the names of the apple, the cherry, the hickory, the beech and other fruit and nut bearing trees, which knowledge, by the way, sometimes brought us into intimate relations with the birch, but the pleasures of a trip to the woods overcome our fear of it, and we soon learned to know and love the trees. Oh! but it was glorious to start off early on a bright morning in autumn to gather nuts! What did we care for a walk of six or eight miles? All thoughts of fatigue vanished as soon as the grand old hickory trees were reached. There we found the squirrels busy collecting their winter supplies, and the birds gathered in flocks preparing for their flight to their southern home, the old leaders flitting from tree to tree, seemingly trying to marshal the chattering, scolding company into some degree of order and discipline before the start on the long journey; and, best of all, the ground covered with the green shells which enclosed the white hickory nuts that were to furnish us refreshment during the long winter evenings. The bags were soon filled, and the boys on their way home, staggering under their loads, reaching home tired and happy, and their dreams were of the trees and the woods. They learned lessons in natural history that day which gave them pleasure through life, and they learned to love the trees. Nearly all boys and girls have a natural love for trees and flowers. Do you not like to go to the woods in the springtime to see the young leaves break-

ing from the buds and the anemones pushing their sweet faces up through the leaves which have protected their roots through the cold winter. I know you do, for I have seen hundreds, yes, thousands of young people enjoying the warm spring days in gathering them, and there is no pleasure in life that equals it.

But, unfortunately, all children cannot go to the woods to see the trees and the flowers, and for this reason the builders of cities—if they are bright, intelligent people such as we have in Minneapolis, provide parks for them where they can see the beautiful gifts Nature has bestowed upon her children, and they plant trees on the streets to beautify them and to promote health and comfort.

"God help the boy that never sees
The butterflies, the birds, the bees,
Nor hears the music of the breeze
Where zephyrs soft are blowing;
Who cannot in sweet comfort lie
Where clover blossoms are thick and high,
And hear the gentle murmur nigh
Of brooklets softly flowing."

We owe a debt of gratitue to the man who is now at the head of the agricultural department at Washington for his efforts in securing to us this day which is set apart for the consideration of our beautiful friends, the trees. May the thousands which have been planted by the school children of our country on Arbor Days grow to be living monuments that shall for all time keep his memory green and his name dear to all who shall live to enjoy their shade.

You cannot realize how much pleasure you will derive all through life for having participated in these Arbor Day exercises, and in the trees which you assist in planting. After you have grown to manhood and womanhood, you will long to see how they have grown, and they will recall memories of your teachers and schoolmates which will lighten the burdens of life and make you young again.

Longfellow never forgot the scenes which surrounded him in his youth, and, many years after he had left them, he wrote a beautiful poem in which he described them. He tells us of the trees on the streets which sheltered him, and of his visit to "Deering's Woods" for acorns; the islands in the harbor; the ropewalk where he saw men spin rope as spiders spin their webs, the remembrance of which caused him to weave beautiful thoughts into his poem, which he called "My Lost Youth." He says when he recalled these scenes that his youth came back to him, as the remembrance of these school days will come back to you.

It is not much more trouble to plant a tree to have it live than to put it carelessly into the ground to die; yet, I regret to say that too many think that all they have to do is to dig a small hole in the sand, just large enough to force the roots into with their feet, and then expect it to grow. I saw this done in front of one of our school buildings, and it is being done every spring by people who ought to know better. A tree must have good soil in which to grow, and it must have water.

The rules for planting and caring for trees are very simple and, if observed, will save much dissapointment. The holes into which the tree is to be placed should be six feet in diameter, three to five

feet in depth, and filled to within two feet of the surface with good, rich loam, leaving a mound in the center on which to set the roots. The roots of the tree should slope downward rather than with the ends higher than at the point where they leave the tree, as I have often seen them. They should be smoothly trimmed with a sharp knife, where the ends have been broken off in digging, and protected from the sun and wind by damp straw, or covered with loose earth until planted. The tree should be held in place at the depth at which it grew, and the roots spread as evenly as possible in the hole. Then good, rich loam should be carefully and firmly worked among them until they are covered. The hole, after being filled, should be covered with heavy mulching.

The trunks of all trees with smooth bark should be protected from the rays of the sun; in fact, all trees recently transplanted do better if protected. Straw rope, wound around the tree, is the best protection, but the wooden guard is much better than nothing. All trees planted on the street should be protected by the guard to save them from injury by the teeth of biting animals. The guards used by the park board are very inexpensive and are worth ten times their cost. When the tree begins to grow, it should be very carefully watched, and, if the season is dry, it should be watered. Do not sprinkle a little water over the surface of the ground every day—that brings the fine roots to the surface, where they will soon dry up—but give them a thorough soaking once in two weeks. By observing these rules, the work done on Arbor Day will bring lasting satisfaction to the tree planters while living, and blessings upon their heads by the generations who follow them.

I thank you very much for your attention. I hope we shall meet each other in the parks and on the parkways for many years to come, and that when the reins of government pass into your hands that you will continue the work of beautifying our city, and that you will make it so attractive that none who see it will ever wish to leave it. Every one admits the importance of out-of-door exercise in promoting and preserving health, and you who have had the advantages of the healthful recreation of rowing or skating on the lakes of our parks, will be better able to testify to their advantages than are a majority of our older citizens.

All of the larger cities of the civilized world are providing playgrounds for the children, where they can have all kinds of games and gymnastic exercises, deeming them essential to their comfort, pleasure and physical and moral development, and I urge you to use your influence in securing them for our city. Keep this in mind, If the result cannot be accomplished before you cast your votes, let your first vote be in favor of it.

Demand bathing houses on the river banks. Ask your parents to go picnicking with you and take the younger children. Load up the delivery and express wagons and drive to the woods, learn the names of the different varieties of trees, study their habits and their wonderful architecture, and you will agree with the poet who sang:

"Summer or winter, day or night,
The woods are ever a new delight;
They give us health, and they make us strong,
Such wonderful balm to them belong."

FLOWER BORDERS.

PROF. BAILEY, in Cornell Bulletin, No. 90.

I wish, instead of saying flower-bed, we might say flower border. Any good place should have its center open; the sides may be more or less confined by planting of shrubs and trees and many kinds of plants. This border-planting sets bounds to the place, makes it one's own; it is homelike. The person lives inside his place, not on it. He is not cramped up and jostled by things scattered all over the place, with no purpose or meaning. Along the borders, against groups, often by the corners of the residence or in front of porches,—these are places for flowers. When planting, do not aim at designs or effects; just have lots of flowers, a variety of them growing luxuriantly, as if they could not help it.

I have asked a professional artist, Mr. Matthews, to draw me the kind of a flower bed he likes. It is a border,—a trip of land two or three feet wide along a fence. This is the place where pigweeds usually grow. Here he has placed marigolds, gladioli, goldenrods, wild asters, China asters and—best of all—hollyhocks. Any one would like that flower garden. It has some of that local and indefinable

charm which always attaches to an "old-fashioned garden," with its exuberant tangle of form and color. Every yard has some such strip of land along a rear walk or fence or against a building. It is the easiest thing to plant it,—ever so much easier than digging the hideous geranium bed into the center of an inoffensive lawn.

There is no prescribed rule as to what you should put into these flower-borders. Put in them the plants you like. Perhaps, the greater part of them should be perennials, which come up of themselves every spring, and which are hardy and reliable. Wild flowers are particularly effective. Every one knows that many of the native herbs of woods and glades are more attractive than some of the most prized garden flowers. The greater part of these native flowers grow readily under cultivation, some even in places which, in soil and exposure, are much unlike their native haunts. Many of them make thickened roots, and they may be safely trrnsplanted at any time after the flowers have passed. To most persons, the wild flowers are less known that many exotics which have smaller merit, and the extension of cultivation is constantly tending to annihilate them. Here, then, in the informal flower-border, is an opportunity to rescue them. Then one may sow in freely of easy-growing annuals, as marigolds, China asters, petunias and phloxes, and the like. One of the advantages of these borders is that they are always ready to receive more plants, unless they are full; that is, their symmetry is not marred if some plants are pulled out and others are put in, and if the weeds now and then get a start, very little harm is done. Such a border half full of weeds is handsomer than the average wellkept geranium bed, because the weeds enjoy growing and the geraniums do not. I have such a border, three feet wide and ninety feet long beside a rear walk. I am putting plants into it every month in the year when the frost is out of the ground. Plants are dug in the woods or fields, whenever I find one which I fancy, even it in July. The tops are cut off, the roots kept moist, and, even though the soil is a most unkindly one, most of these much abused plants grow. Such a border has something new and interesting every month of the growing season; and even in the winter the tall clumps of grasses and aster-stems wave their plumes above the snow and are a source of delight to every frolicsome bevy of snow-birds.

A NEW GRAPE TRELLIS.—Mr. T. V. Munson, a most successful and progressive grape grower of Texas, has devised a sort of trellis which is highly commended by those who have tried it. It consists of posts, set at suitable distances apart in the row of vines, standing five and a half feet high from the surface of the ground. To the top is nailed a crosspiece of 1 x 6 stuff, two feet long. Along each end of these crosspieces a wire is run so that the trellis has two top wires two feet apart. Eight inches below them a single wire is run, which is fastened directly to the posts. In using this trellis, a strong cane is brought up to this lower wire and the top pinched off and two branches trained to run along the wire, one each way. Then when the bearing branches appear, next season, they are carried out at the sides and hung over the top wires. Thus the fruit hangs down in easy reach for spraying and picking, yet is, at the same time, in the shade of the foilage of the vine. The bearing wood is renewed each year by two new side shoots brought out from the top by the upright cane.

SWEET POTATO CULTURE.

J. R. CUMMINS, WASHBURN.

Within the limits of the state of Minnesota there are many districts adapted to the successful cultivation of the sweet potato. One of the first considerations of the intending grower must be whether the locality is likely to be free from frost through June, July and August. The nature of the soil and subsoil have a great effect in preventing frosts. On sandy or sandy loam, well drained and sufficiently elevated not to be affected by moisture from streams or marshes, frosts may not be injurious until October, as was the case last fall in favored locations. The cultivation of the sweet potato is entirely different from that of the common sort. The sweet potato is planted in a hotbed from April 20 to 30, and the plants ought to be grown large enough to be set out in the open ground by June 1, as this is generally the earliest date to safely set them in this latitude.

In making up a hotbed at least two feet in depth of manure should be used, and two feet outside of the frames. The soil in the bed should be six or eight inches deep, and a large portion should be of sand. Great care must be taken to keep a proper temperature in the bed, probably about 70° or 80°. Having never raised plants, I will describe the method as given by a cultivator: "The tubers should be placed lengthwise, end to end, in rows six inches apart, and covered three inches deep. In two or three weeks, according to heat of bed each tuber will throw up five to thirty sprouts. As soon as these are four or five inches high take up the tuber carefully and break off the sprouts close to the potato, so as to save the side roots. The tubers may then be replaced for the production of a second and even a third crop of sprouts." Sweet potatoes from the South are probably better for seed than from the North, and those that are large but not long would be best for our soil. There seems to be a tendency here for the tuber to grow long and slim. But for any one intending to grow a few potatoes, it would be preferable to buy the plants. They are offered at $2.50 per thousand and, sometimes, at less. The plants should not be on the road over twelve to twenty-four hours. In warm weather the sprouts are very likely to heat, and if this happens very few will grow.

A sandy soil or sandy loam is the best adapted to growing the sweet potato. They can be grown on clay lands, but in wet seasons would not be likely to ripen well and would not be sweet. The ground should be well plowed and harrowed; furrows should then be opened five or six feet apart, by plowing one way and then back. These furrows should be partly filled with manure, the amount used depending something on the quality of the land. The furrows are then plowed back from both sides, making ridges twelve or fifteen inches high. These ridges should be gone over with a hoe or rake and smoothed off. The plants are then set out on the ridge, fifteen or eighteen inches apart, choosing damp weather to set them. Before setting out, the roots of the plants should be dipped in a mixture of soil and water of a proper consistency. Should the

weather be dry and hot, cover the plants with leaves or grass cut, if possible, when the dew is on. It will require from six to seven thousand plants to set out an acre in the way described. Between the ridges a cultivator can be run, and around the plants a hoe or tined hoe must be used frequently until the vines cover the ground.

The sweet potato is sometimes grown in hills three and a half or four feet apart. A single shovel plow is used in marking out the hills both ways. Some manure is placed in each hill, and the hills made up with a hoe. There is considerable more labor needed in this method than where grown in ridges. The ridge method is also preferable in this state, because in dry seasons the moisture would be retained better. I have tried level cultivation but never had any success, the potatoes being few, long and smooth.

The sweet potato vine very much resembles wild buckwheat. After the vines have made some growth, they send out roots which may make small tubers, but which always injure the main crop if the vines are not lifted occasionally to prevent this rooting.

DIGGING AND KEEPING.—The vines should not be killed by frost before digging, as this may injure the keeping qualities of the tubers. If not ready to dig and there is probability of frost, the vines should be cut off, and the potatoes dug afterwards. Advantage of dry weather should be taken in digging, and those to be wintered should be carefully handled, not breaking the skin. The tubers should be placed thinly in a dry, cool room. A cellar if any way damp is not a proper place. For keeping them into or through the winter, they should be packed in boxes in fine and perfectly dry sand, and placed in a cool and dry room where the temperature does not go below 40° nor much above 60°. Sometimes they decay in spite of all care, probably from not being sufficiently dry. The sweet potato kiln-dried is in better condition to keep over winter. The sweet potatoes of 1894 were as sweet and in quality as good as the best from the South. In wet seasons the quality might not be so good, but in any year they ought to equal those grown in Illinois or Iowa.

From last year's experience, the yield is not profitable, but in comparison with that of the common potato, the result should not be discouraging. Since the Burbank Seedling in 1891 yielded on an adjoining lot at the rate of only 25 bushels to the acre and in other years 150 to 200 bushels, it would not be fair to judge either by last year's crop. Of the 1000 vines planted, at least one-third were killed by the heat and dry weather in July and August. There was gathered five bushels, large and small, which would make a yield of 50 bushel to the acre; nearly one-half were very small; on one vine were eighteen potatoes, six being large. The annual importation of the sweet potato into this state must amount to a great many thousands of bushels, and the money sent out of the state for a product which there is every probability can be profitably grown here in many locations amounts to a large sum.

HOUSE AND GREENHOUSE PLANTS.

FRED WINDMILLER, MANKATO.

In this, my first report to the society, I have not fully complied with the requirements—the greenhouse department I have omitted altogether. I am not yet able to give important information in this branch; also, new plants are not represented, as I did almost no experimenting last season. Assuming that most members are interested in house plants, I have made this the sole topic, giving hints on culture, reasons for failure, best kinds and unworthy stock, as far as has come under my experience.

Perhaps nothing else occupied the attention of amateurs more last year than better places for growing plants. We have now plenty of material to select from, excellent varieties, but all is of no avail if our quarters are unsuitable. Everywhere we hear the same remark: "If I only had a place for plants."

Much has been said and written, and now I submit my ideas, based on observation and experience. Few can build a greenhouse (and without hot-water heat most fail, even if they have it), while the window sill is no good. It is the *bay window* that needs improvement to fill our want. Large bay windows are everywhere and with small expense might be made a home for flowers. First, such a window should be built out as much as possible, to give light from three sides. Then, the inside walls must be finished in wood, painted, and without curtains or other troublesome material. Next, the floor space is to be done with zinc, perfectly water tight, with all the sills and shelves shedding water into this zinc basin. The whole window is then best shut off from the room by a glass partition with sliding windows, which may be opened at will to admit heat in cold weather.

Where city water is available, the next step is easy. Have a connection made, fitted with a short hose and a spray nozzle. If water works are not there, bolt a little force pump to the wall and proceed as above. On every sunny morning, it is an easy matter to thoroughly clean the plants. You can get the water under the leaves and above, also in every corner. The red spider is an impossibility there, and the green fly will not stay if the water pressure is good enough. In such a place, roses and carnations can be grown almost to perfection, as moisture is easily supplied. Would it not be lovely to see bay windows gay with carnations? The key to success is this spraying. I have at this writing carnations in boxes within three feet of a hardwood box-stove, constantly exposed to direct radiation, which often means 80° of dry heat. Yet all are perfectly healthy and full of flowers, but, of course, they are sprayed daily. Nearly all plants would flourish in such a window, besides it would improve the air in the room.

More plants should be grown in boxes. These are better than pots or cans, are cheap and easily watered. A very pleasing effect is a window box properly arranged. The most successful amateurs use boxes freely both inside and out-doors. New pots should be soaked in water before using, and saucers must never be allowed full of

water. Don't use large pots—for large plants, six to seven inches are sufficient, while common ones are best in four and one-half to five inch pots.

The alyssum, double sweet, makes an admirable box or basket plant in-doors.

The abutilons must have plenty of root room; prune or pinch freely. The Souvenir de Bonn is a valuable new one. The Eclipse makes nice hanging baskets.

Callas must be rested in summer to secure flowers in winter. Lay them out-doors in summer on the side to dry out and re-pot in August. Plenty of water, heat and liquid manure, with small pots, makes them flower freely. The Little Gem, spotted and common calla are good kinds.

Begonias. Tuberous are most beautiful; they must have moist air, large pots, light—but little sun, and much water. These plants are wonderful when well done, but very unsatisfactory if neglected. They are summer blooming. Mrs. French, Deutcher Ruhm, Lafayette and Louis d'Or are good double varieties.

Rex begonias are not watered over the leaves. Keep them facing east, west or north; they dislike the hot sun. An occasional showering or sponging is necessary. Do not fuss with Lucy Closson or Countesse Erdody, but raise Silver Leaf, Rex, Marguise de Peralta, Mrs. Shepard, etc. Among flowering begonias, Rubea is first, then Vernon, Metallica, Alba Picta and Otto Hacker are good. Cannas are showy pot plants. Give them rich earth, sun and much water. Star of '91 is still the best for pots, as it is the smallest. Koenige's Charlotte is the best new variety. Carnations want a cool place and sprinkling. Grow Aurora, Fred Dorner and Lizzie McGowan. The Marguerite carnations are not worth growing. Cyperus alternifolius (umbrella plant) is a good all around plant; it looks like a palm and is tough and hardy; it grows in earth or water, sun or shade, and is very desirable; it has no insect pest; the striped variety is pretty. Fuchsias are summer blooming and have no business in a warm room in winter. Put them in your cellar. In summer, water freely and give a shady place. Mrs. Hill is the best white; Phenomenal the best purple and double.

Ferns. The Nephrolepis davalloides and exaltata are very good house ferns. These make fine pots or baskets. Build a loghouse of sticks, line with moss and fill with earth for a hanging piece.

Geraniums want small pots and a rather dry, warm place. Heavy clayey earth is best. The newer single varieties are excellent.

Pelargoniums (Lady Washington) are to be kept very cool in winter and free from aphis. The common bud dropping is caused by overheating. Hibiscus are among the best evergreen, enduring plants. The flowers are very large and produced freely in warm quarters. Never let these get chilled; pinch freely and give large pots. It has no insects and is very desirable summer and winter. Grandiflorus, Versicolor, Sub-Violaceous, Rubra, Miniatus semiplena are cultivated. Hydrangeas are often spoiled by pruning. Never pinch or prune after a growth is made, as a flower bud is on the top of the shoot. Keep them shaded and moist in summer and encourage a

rank growth by liquid manure. It is very desirable. Thomas Hogg, Ramispictis, Otaksa are leading varieties. Manettia Bicolor is charming in winter in a sunny window. Give it strings to spin upon.

Marguerites (Chrysanthemum daisies) are always in bloom. Give them sun and plenty of root room. Grow both yellow and white; also, the double form. Otaheite Orange is a dwarf orange of value, bearing fruit in pots and is easily grown and desirable.

Primula obconica is the best constant bloomer we have. It is very easily grown and satisfactory. The leaves and stems are poisonous to the touch of some persons *at first*, but soon any one can handle the plant with impunity. Primulas are best near 50° temperature.

In Chinese primroses, the large, fringed white is best. Where only a few are wanted, the pink and red are not worth growing. Water the roots freely and keep the plants cool.

Palms. The best varieties are always Latania and Kentia. In this state, such as Areca, etc., are too easily chilled. In a modern parlor, palms require much more water than is often given. Soak them thoroughly if they get dry quickly, and sponge the leaves once a week.

Roses as a rule are not house plants. If you have them, do not remove blind wood while they grow, as it checks the plants. Sprinkle the leaves freely and remove the green fly promptly. The Clothilde Soupert is good in-doors, so is the La France and Agrippina.

Solanum jasminoides is unsatisfactory here, and I have destroyed every plant of it. It is a shy bloomer and too much bothered by potato bugs in autumn. I consider it not worth bothering with, nor the blue one, either.

Water hyacinth is a pretty aquatic, interesting, easily grown and desirable. Put some sand or mud in a glass bowl or aquarium, fill with water and let them float. Keep them warm and sunny.

Lilies. Among these the Harrisii makes the best pot plant. To kill the green fly, gently stroke the crown with the fingers upwards twice a week, pressing hard enough to kill the insects inside. This is important to success. Two bulbs of the 5-7 size in a six-inch pot are best.

Hyacinths. Single hyacinths are best in-doors, and white, soft pink and porcelain-blue are the best colors. Get these in named varieties to secure good stock. The yellow varieties are very satisfactory.

Roman Hyacinths will bloom for Christmas if potted early, and are, therefore, much esteemed. They are smaller, send up many spikes and are best planted in numbers in flat boxes or crocks, ten to twelve bulbs in each. Freezias must not be put away in the dark nor frozen, but given a medium warm place right after potting to induce growth. When up, keep them rather cool. Tulips and Narcissi do best in shallow boxes or crocks, ten to twelve in each, and should be brought to the light any time after Christmas. The Chinese Sacred Narcissus is best in water and will bloom for Christmas. Be sure to secure the bulb with stones to make it stay in place, and keep the water clean.

Anemones, Ranunculus, Crocus, Oxias, Sparaxis, Chinondoxias, etc., are not worth growing in the window garden, as there is better stock for that limited space.

SECRETARY PHILIPS' EXPERIMENTS IN APPLE GROWING.

Written at my request by E. S. Goff, Professor of Horticulture at the Wisconsin Experiment Station, Madison, Wisconsin.—Secretary LATHAM.

All interested in apple culture in severe climates may see some valuable object lessons in the orchards of Mr. A. J. Philips near West Salem, Wis. Mr. Philips, who is the present secretary of the Wisconsin Horticultural Society, is well known in the Northwest as a horticultural writer. Some horticultural writers use the pen with greater facility than horticultural tools, but a visit to Mr. Philips' orchard very soon convinces one that his opinions on apple culture, which have been so widely published in the Northwest, are grounded upon abundant practical experience.

Mr. Philips' orchard, like all the successful orchards of the Northwest, is a good place to study hardy varieties, because it shows at a glance the sorts that are capable of enduring severe climatic conditions. If it does not show the scores of varieties that have failed and been consigned to the brush-heap during Mr. Philips' 27 years of apple growing experience, it does show at once the "fittest" few that have survived. But the most important object lessons in Mr. Philips' orchard are his experiments in top-working on crab stocks. Here are to be seen several varieties grown from root-grafts, and also top-worked on one or more varieties of crab, which offers opportunity to study the effects of top-working. Much might be written on this subject, but I can here touch upon but a few points. It is clearly shown that one variety of crab on Mr. Philips' grounds, viz., the Virginia, is remarkably well adapted as a stock for the apple.

Several years ago, when Mr. Philips was starting his orchard, he went to the nursery of the late Mr. Wilcox, of La Crescent, to purchase some trees. Mr. Wilcox had already commenced top-working the Virginia crab, and inquired of Mr. Philips if he preferred top-worked or root-grafted trees. Mr. Philips replied that he had no faith in top-working and must have the root-grafted trees. After filling his order, Mr. Wilcox added, "I want you to try my top-worked trees, and if you will promise to plant out a few and give them good care, I will make you a present of some." To this Mr. Philips agreed and was presented with a few top-worked trees of some of the same varieties that he had purchased. Today, the only trees of this planting that survive are the top-worked ones—the others having long since been consigned to the brush heap.

But this is not the only testimony Mr. Philips has in favor of top-working on the Virginia crab. After careful observation through several years he finds that he secures larger crops and finer fruit from trees top-worked on the Virginia than from root-grafted trees, and that when he is looking for fruit for exhibition he has formed the habit of going first to his top-worked trees, for they almost always carry the finest specimens. I observed many varieties top-worked on the Virginia crab, but failed to find one that has outgrown its stock, while varieties worked on Whitney No. 20, or the

Siberian crab, have generally outgrown their stocks. The Virginia crab is sufficiently vigorous to keep up in growth with any of our apples, and, unlike many crabs, it is almost wholly free from blight. It branches at right angles to the trunk, and every branch enlarges at its union with the latter, so that it is well braced in all directions. The branches of the Virginia crab very rarely split down, however much fruit they carry. The wood is white and remarkably firm, which gives it great strength.

Beside his experiments with the Virginia crab, Mr. Philips is testing a large number of varieties of the apple. Almost all of the more recent introductions in the Northwest are to be found in bearing on his grounds, as well as a large number of promising seedlings that he has gathered from Wisconsin, Minnesota and Iowa. As a place to study varieties alone, Mr. Philips' orchard is well worthy a visit. His plantings are more extensive than many suppose them to be. The subject of top-working on hardy stocks, deserve more attention than it has received. While considerable has been done in this direction, it is probable that much is yet to be learned. Mr. Philips' claim that productiveness is increased by top-working is by no means incredible, for there is little doubt that grafting often has this effect. It is probable that grafting generally results in shortening the lives of trees, but when the question of trunk hardiness is involved, there is no reason to doubt that it may sometimes have the opposite effect. Mr. Philips' experiments in top-working on the Virginia crab are especially valuable, because they demonstrate that we have at least one stock that, while fully satisfactory in other respects, forms an excellent union with a wide range of varieties of the apple.

WHY COTTONWOODS DIE.—A friend in Grant county, Minn., says that his cottonwoods (about 12 years old) died last summer, and he would like to know the cause. There was a severe drouth in his locality, and that killed the trees. It may seem strange that heretofore vigorous trees, 12 years old, were killed by one season's drouth, but the reason given by Mr. Wm. Somerville, one of the best planters of forest trees, seems to account for it. Trees growing from seed have a tap-root, that so penetrates the earth that it finds moisture to carry the tree through the adversity of a dry summer. But if grown from cuttings, and most cottonwoods are, there is no taproot; all roots are near the surface, and the ability of the tree to stand drouth is reduced to the minimum. The remedy in such cases is mulching with old straw, slough hay, or anything that will prevent the soil from drying out. The mulching must not be placed around the trunk only, but out where the roots are. Bearing this in mind may be the means of saving valuable trees hereafter.

THE ORCHARDS OF MINNETONKA.

NOTES BY A. W. LATHAM, SECY.

In the past week, in company with some friends of horticulture, I have taken two short trips about the fruit region of Lake Minnetonka. The observations made prove very encouraging for the prospects of apple growing in that section.

The first place visited was that of Mr. M. Pearce, who occupies ten acres about one mile from the east shore of the lake. This place is not in what is considered the apple belt of the lake, as his soil, while of a rich sandy loam, has a somewhat gravelly subsoil. However, Mr. Pearce is enough of an enthusiast to overcome in large measure the natural defects of his location, and, for the number of years he has occupied the tract, he has considerable of interest to show.

Mr. F. G. Gould of Excelsior and Mr. A. H. Brackett of the north shore made up the party at this place. We found a few dozen peach trees of several varieties, six to nine feet high, looking very healthy. They had borne some fruit this year, which had already been gathered and sent to cold storage for exhibition at our winter meeting. Mr. Pearce seemed full of confidence in his ability to grow peaches, and his warm soil is as well adapted as any for that purpose. He has also a few healthy specimens of the Ostheim cherry, about the same size as the peach trees. The birds largely gather the fruit for him.

Mr. Pearce has two plats of this year's planting of strawberries and raspberries, including a number of the standard and newer varieties. These varieties were so equally vigorous and healthy that it seemed impossible to discriminate between them, as far as appearance goes, as to which are best adapted to his location. They had evidently received the best of care.

The objects of most interest at this place are the fruit trees which have been double-worked. In his case "double-worked" means the grafting of the variety which he desires to grow on the stock of either a Virginia crab or the Tonka, which latter is a seedling of his own. There were a lot of the Lieby and a few of the Wealthy and some other varieties worked on the branches of Virginia crab trees which appeared very healthy and promising. They were bearing some fruit.

In the nursery there was quite a block of one-year old trees, and some two-year, also, which had been double-worked in the root graft; that is, an ordinary root graft was first made with a scion of Virginia or Tonka and then the variety which he desired to propagate had been grafted into the Virginia or Tonka scion, all done at the time of making the root graft,—thus placing two or three inches of crab wood between the root and the scion which was intended to make the tree. This is evidently a new departure in the making of root grafts, and the results will be watched with interest. The yearling and two-years old trees from this system of grafting are evidently of more vigorous growth than those of the ordinary root grafts standing alongside. The experiment so far promises well.

The next place visited was in the clay belt, or what more properly might be called the apple belt, the place of Mr. George H. Smith at

Long Lake. Here are one or two hundred trees, mostly Duchess, Wealthy and crabs, and a few interesting seedlings. This orchard is standing on a gentle south slope on a rather elevated hill and is open to the south and to the west, but is protected on the north partly by a grove. Most of the trees look fairly healthy and are very profitable, this year's crop amounting to two or three hundred bushels.

About two miles west of this place, mainly on the north slope of a high hill, stands the orchard of the late Mr. C. W. Gordon, whom you will recall as a valued member of our society. It is now under the management of Mr. A. B. Coleman, a son of Mrs. Gordon. There are several hundred trees in this orchard, mostly Wealthy and Duchess, perhaps fifteen years old, or thereabouts. It was a sight to see the fruit still on the trees, and a large amount had already been gathered. The orchard was in grass, but it had evidently been ploughed in the spring.

The last place visited that day was Mr. A. H. Brackett's. This is a new place within sight of Lake Minnetonka, located on high and quite rolling ground. The berry plantations, covering a number of acres, were very thrifty and vigorous and showed the best of care, as did everything about the place. The fruit trees, of course, were too young to be an object of special interest. Mr. Brackett has done something in the way of irrigating a portion of his place with windmill and tank, and the fruit from the part irrigated has proved a valuable object lesson to him and his neighbors. It will pay any young horticulturist well to visit Mr. Brackett's place and see the advantages of thorough cultivation.

A second trip took me first to Excelsior, where in company with Mr. F. G. Gould, Mr. A. H. Brackett, Mr. D. V. Plant and Mr. Whitney of Long Lake, we visited a few of the orchards of this section. At the old Murray place, on a very high hill, one mile south of Excelsior, we found an orchard of some two hundred trees, standing in sod on an eastern slope. The trees were in the main healthy and have borne this year a very heavy crop. The varieties are the usual ones for this section of the country, with the exception of some half dozen Haas, which seemed to be as hardy as the Wealthy and Duchess and were heavily loaded with large and highly colored fruit. This orchard was planted some twenty years ago.

About half a mile north of this orchard is the home of Mr. E. S. Bardwell on the north slope of the same hill. Here is an orchard of several hundred trees left over from a nursery planted by Mr. F. G. Gould fifteen or twenty years ago. The finest Duchess apples by far that we saw were in this orchard, and the same can be said of the Wealthy, except they were not as highly colored on account of the closeness of the trees. These trees have borne a very large crop of fruit this year. It was from this orchard that the bulk of the Duchess and the Wealthy were secured that were used in the Minnesota fruit exhibit at the New Orleans' Exposition and also at the late World's Fair. A peculiarity in the management of this orchard is accountable, I believe, for the large size of the fruit and the productiveness of the trees. It is suitably enclosed and used as

a pasture for the hogs, which loosen the ground and keep down the grass as well as add to the fertility of the soil.

From here we visited the old seedling orchard of Mr. Peter M. Gideon, especially to see the original tree of the Martha crab. We also found there the original trees of the Florence and Mary crabs, which were of interest, all three of these trees being evidently of the same age, about twenty-five or, perhaps, more years, judging by appearance. The Mary was notable especially for the large size of its fruit, as large or larger than the Canada Red, and the Florence is a beautiful crab of high color; both varieties were bearing fairly good crops. The Martha crab was by far the handsomest and most noticeable variety of crab exhibited at the World's Fair. It is of a beautiful, deep blush pink and covered with a heavy bloom. It is somewhat larger than the Transcendent. Further description is scarcely necessary, as it is quite well known to the fruit growers of the state. The original tree, I understand, is an annual and a heavy bearer, carrying this year an enormous quantity of fruit. Its beauty, high color and comparative freedom from blight, make it apparently a valuable addition to our list of crabs, and perhaps it may be found of especial use as a stock for double-working. There were here and there a dead twig or a short inside branch dead, but nothing that upon close examination seemed to be blight, and judging by the appearance and what we could learn, it is proof against this disease.

The only other place visited after this was an orchard planted by Mr. M. Perry some eight years ago, and now owned by Mr. Alfred Sherlock. This is on a very high and steep hillside facing the east. Several hundred trees are making a rapid growth and bearing for their size a great deal of fruit. The ground is cultivated one way and set to currants and goosberries. Besides the usual varieties we found several Longfield,heavily loaded and a half dozen or more trees of the Excelsior and October crabs, which were an especially beautiful sight. These crabs are almost as large as an average Wealthy, very highly colored and with a most beautiful bloom. There was another noteable variety bearing a large white apple, of which we could not learn the name.

There are some lessons to be learned from these short excursions. The successful orchards are all standing on high ground. They were all on some slope, either north, south or east. The cultivated orchards, either by hog power or by horse power, were apparently the most healthy and vigorous and produced the finest fruit, that used as a hog yard being, as regards results, the best of all. A pertinent query is, why people who have similar locations—and there are plenty of them all about the country—don't plant orchards by the ten acres, instead of raising grain at a profit of a few dollars an acre. Thousands of acres about the lake region might produce in their season all the apples needed for this section and the country north and west of us at a great margin of profit for the grower. This is evidently the northern limit of profitable apple culture, and the time will surely come when these hillsides will be used for this purpose. Why they don't do it now is a hard thing to understand.

Minneapolis, August 17, 1895.

REPORT ON NOMENCLATURE.

J. S. HARRIS, LA CRESCENT, CHAIRMAN OF COMMITTEE.

Fruits received for examination.

Aug. 1. From Wm. Oxford, Freeburg, Minn. A package of native plums. The variety is very early, from 20th of July to August 1st; size large; form round ovate; color dark red; flesh rather soft; flavor good—said to be good for cooking; stone medium large, thin and flat, of Cheney type, a cling.

Aug. 5. From W. S. Widmoyer, Dresbach, Minn. Two varieties of apples for naming. One is a medium sized, red or red striped on yellow ground, of fine subacid flavor, which proves to be Sops of Wine. Trees are generally nearly hardy. It is often known as Early Washington and is of European origin. The other is above medium size, flatish-round form; color when fully ripe creamy white with a few irregular white dots; stem short and stout, set in a broad green russeted cavity; calyx nearly closed in a broad, shallow, considerably wrinkled basin; flesh white, tender, juicy; flavor pleasant acid with a trace of subacid; season, August. It is probably of Russian origin and may belong to the Transparent family; name not known to us.

Aug. 6. From John Carsin, Dakota, Minn. Three varieties. One is the Duchess of Oldenburg. Another is a seedling of large size; form roundish, slightly ridged; color pale greenish-yellow, striped and splashed with crimson red on sun side; the core is rather large and the seed cells open; flesh a greenish-white and a little coarse;flavor a pleasant acid; the season is probably September; tree good. The third variety is medium size in form and appearance, much like the last; flesh finer and flavor rather better.

Aug. 8. From Wm. Decker, Dresbach, Minn. Extra fine samples of Russian White Transparent.

Aug. 13. From H. Knudson, Springfield, Minn. Fruit said to be hybrid sand cherry. The fruit averaged ¾ x ⅞ inch in diameter; form round oval; color dark cherry red; stem ⅝ inch long in a regular rather deep cavity, and should judge the fruit will hang to the tree well; flesh greenish-yellow; skin rather thick; flesh of good consistency and has considerable of the domestic plum flavor without acidity; stem medium large, thick, oval; fruit keeps better than native plum.

Aug. 14. From Clarence Wedge, Albert Lea, Minn. Samples of sand cherry, large size and excellent flavor.

Aug. 15. A box of native plums,without name or residence of sender. They are medium large, round, dark red fruit of good flavor and appearance, very free from acridity in skin and about the stone. Its value will depend much upon fruitfulness of tree and cooking quality of fruit.

A TRIP THROUGH THE ORCHARDS OF MINNESOTA.

MADE BY PROF. S. B. GREEN AND CLARENCE WEDGE IN AUGUST, 1895.

Mr. Wedge and I have been making a short trip through the orchards of the state with the purpose of preparing a report on their condition, to be given at the winter meeting of our horticultural society next winter. We have in mind further journeyings of a like nature before the growing season ends.

Our worthy secretary, however, has asked me to write up a sort of preliminary report of our trip which, without giving away all our "thunder," shall show something of the condition in which we found things. We made the trip largely by railroad but carried our bicycles with us to help out, and found them of very great assistance. We went in light marching order, dressed in sweaters, but neither of us seems to be quite up to the point of wearing "bloomers," as the boys call short pants.

We started from Minneapolis on Monday noon for Excelsior, where we visited Peter M. Gideon and looked over his seedling apples with much interest. Mr. Gideon says it is "right smart hard" to tell the difference between the Wealthy and Peter apples, but that the Peter keeps better than Wealthy. From there we pushed on to Waconia. A severe rain had preceded us which made the roads almost impassable for bicycles and delayed us so long that it was nearly supper time when we reached Mr. Andrew Peterson's place. It was our intention to have gotten back to Excelsior the same night, but the heavy roads and threatening rain made this out of the question. Mr. P. kindly put us up for the night. Among some of the object lessons here are his Lieby apple trees, which are very large, spreading fully thirty feet, with a trunk circumference of thirty inches, but bearing no fruit this year. They have, however, been very productive, and seemed good for many more years of service. The Anisim apples, formerly called Good Pheasant, we found bearing heavily, though a few of the trees seemed to be root injured.

Now "stick a pin right here" and remember that—I think, without exception—whenever on this trip we found trees under the name of Hibernal or Lieby, they looked well and generally bore some fruit, and the owners believed in them. Our society makes no mistake in recommending it as the hardiest of the well tried varieties.

Among other varieties represented that showed vigor and fruitfulness were Cross, Wolf, Patten's Greening, White Pigeon and Minnesota crab. Charlamof was not bearing, but the trees appeared far hardier than the Duchess. Mr. Peterson's place is admirably kept and a great many points of interest were noted.

Tuesday A. M. we bicycled it to Victoria and took the train for Minneapolis, arriving there about 9 o'clock. As there were no trains out of town in directions in which we wanted go, we went on bicycles to Farmington, where we visited Mr. Parker, who is located on the prairie about two miles from town. Here we found Hibernal heavily loaded with fruit and the tree perfect, and the Whitney, Tetofsky and Duchess apples and Minnesota and Strawberry crabs doing well. He

also has a large number of the best Russian varieties, in a new orchard, that are looking well. Mr. Parker has a very pleasant home and his place shows that both he and his wife love horticultural affairs.

Tuesday night we went to Lake City, where we arrived at 10:30. Spent the night with the worthy president of our society and the next day visited his extensive orchards and nursery. We found the Anisim apple, which was here as usual a tardy bearer, loaded almost to the ground with nice fruit, and the Hibernal sound and fruiting heavily. The Duchess fruit had all been picked, but had evidently been a heavy crop, as were many crabs, notably one of the Pickett's seedlings and the Early Strawberry. Here were, probably, fifty young trees of the Okabena bearing heavily, and the fruit was very perfect. In fact, all the fruit at this place was fair and quite free from blemishes.

Mr. Underwood has an orchard high up on the north side of a steep bluff, part of which is grown on "the forest orchard plan," by cutting off the original tree growth, planting the apple trees and mulching without further cultivation. Part of the land is so steep as almost to preclude cultivation. The trees here looked well, and it was, in our opinion, a most favorable place for an orchard. The dwarf eavin juniper (Juniperus Sabina) is grown in the nursery here in large quantities and is a very desirable plant for a low evergreen windbreak. It is extremely hardy and bears close pruning well.

Late Wednesday afternoon we spent several hours at Minnesota City looking over Mr. O. M. Lord's place, which is very prettily situated in the valley near the railroad station. Mr. Lord had two or three varieties of peaches fruiting well, and we had the pleasure of testing them. The Japan plum called Ogon looked better than we expected and has produced fruit, but it is evidently too far north for profitable culture. Mr. Lord's plums were very excellent. He thinks the Rollingstone the finest American plum. He also says of other plums that Cottrel is a magnificent fruit, and that the Wyant does very well, but he thinks Iowa parties have lauded it too highly. The Cheney plum, he says, is one of his best but is a little soft for shipping. Comfort plum was bearing a heavy crop of large, fair fruit. Mr. Lord has had a very excellent crop of strawberries this season, and his new bed looks very well. He has many varieties.

We next visited Mr. J. S. Harris' home at La Crescent, which is picturesquely situated high up on one of the bluffs, surrounded by fruit and ornamental trees in great variety. Mr. Harris has a great variety of fruit plants and is making a careful trial of all the promising varieties he can get hold of. He has many large trees but, also, an excellent young orchard containing very many varieties. Here we saw two Flemish Beauty pear trees bearing about a bushel of fair pears each, and the trees were very healthy. The largest Duchess tree we have seen is here located and will spread fully thirty feet. Dartt's Hybrid apple was heavily loaded. Many varieties of the old apple list, such as Haas and Utter, were doing very well. The Avista, originated by A. J. Philips, we found blighting

badly here, and the same was true of it in the two other places where we saw it growing. The Pride of Minneapolis crab was also very productive here. The Cheney plum trees seen at this place are very large and were bearing a tremendous crop of fruit. It was the finest thing in the plum line that we had ever seen.

On Friday we visited Mr. Wm. Somerville, of Eyota, Olmsted county. He has a large, old orchard of the standard kinds and a good, young orchard of the newer sorts. We found the Malinda top-worked on Transcendent bearing heavily, one large tree bearing probably fifteen bushels of fruit. Sweet Russet is highly esteemed by Mr. Somerville. One of his Transcendent trees measures fifty-eight inches and is sound every way. The Striped Anis was doing well. The trees are large and sound but not very fruitful. Other trees looking well are the Kourk Anis, White Pigeon, Longfield, Juicy Bur, Repka Malenka and Rollin's Prolific.

The raspberries here are in excellent health and very productive. They are grown in rows seven feet apart and the whole ground heavily mulched. Mr. Somerville prides himself on his garden, which was in an exceptionally flourishing condition. He has most of his apple trees tied together by inarching twigs from one main branch into another. Some of these grafted branches are several inches in diameter and make giving away in the crotches almost an impossibility.

Friday afternoon we took in Mr. R. C. Keel's place as we bicycled it from Eyota to Rochester. Mr. Keel has a very light crop of apples this year. Here we found the Virginia crab doing especially well. Several of the trees spread fully thirty feet. Mr. Keel says he prefers this to the Transcendent, as the trees do not blight, and the fruit keeps longer. The Wealthy is here doing especially well top-grafted on Transcendent crab. The Gilbert is an apple resembling the Duchess but is several weeks later; it is productive and healthy. The Minnesota crab was doing especially well.

From Rochester we drove to Hammond to the home of Mr. Sidney Corp. The land here is very high prairie. The orchard is enclosed on all but the east side with windbreaks. His original planting was made twenty-eight years ago, and of these the Duchess and a few other kinds are in almost perfect condition. Here we saw large, heavily laden, thrifty trees of the McMahon, Brett No. 2, Hibernal, White Pigeon and Anisim apples and Minnesota and Strawberry crabs. The Avista and Autumn Streaked apples were badly blighted.

We spent Saturday at the Owatonna Experiment Station. The work of this station has so often been reported on by its able superintendent, E. H. S. Dartt, that it would be superfluous to refer to it at length here, except to say that his valuable work is originating many new kinds of apples, and that there is growing here a remarkably large and promising lot of seedling apple trees whose future should interest every friend of horticulture.

PROF. S. B. GREEN.

September Calendar.

BY J. S. HARRIS.

About this time of year every young fruit tree in the orchard or the garden should be examined for borers with great care, and, if any have found lodgement in the stem, they must be cut out or killed by probing the burrows with a wire. Another washing of the trunks with strong soapsuds to which a little carbolic acid has been added will prove a paying investment in cleaning the tree of moss and destroying the eggs of insects. No plowing or cultivating should be done in the orchard during this month, lest it stimulate to a late growth or starting of buds.

Gathering of fruit is a leading feature of the work of this month. All fruit designed for market should be carefully hand picked and assorted as it is put into clean packages. The man whose fruit is of a uniform quality and size throughout, instead of small and inferior in the center of the package, will soon be found out, and he always finds a ready sale for it. Where trees have been budded, the trees should not be allowed to remain longer than two weeks, lest the restriction of the flow of sap cause the buds to start this fall.

The patch of currants and gooseberries should be cleaned of weeds, but the soil should be disturbed as little as possible. Currants are generally propagated by cuttings which are made and set at once, or they may be kept over winter by burying out of doors or in a cool cellar. The cutting should be six or eight inches long and set with one or two buds above the ground and, about the time winter sets in, covered with mulching.

Grapes are now ripening. Do not prune or remove any foliage, expecting to hasten the ripening—it will retard rather than hasten. Grapes must be allowed to ripen on the vines; they will not ripen any after being picked. Where grapes are put up for market they should be thoroughly ripe and very carefully handled; the practice of putting grapes upon the market before perfectly ripe lessens the demand and lowers the price.

Strawberry beds should be kept clean as late as weeds grow for the balance of the season; very shallow hoeing or cultivation is the best. As soon as the desired number of plants have rooted keep the runners clipped off. Late plants are almost worthless for fruiting or planting in new beds. Old beds that are being kept over will be greatly benefitted by giving them a liberal dressing of fine barnyard manure.

Aid the blackcap and Shaffer raspberries in making new plants for next spring's setting by placing a little fine soil over the tops or pegging them down so they will not be swayed about by the wind.

Wherever orchards are to be planted or new berry plantations made next spring, the ground should be prepared for them now.

Late weeds thrive vigorously in the rich soil of the kitchen and market garden, and hoeing and raking should not cease until frosts

put a stop to their growth. Mow and burn the tops from the aspaagus beds as soon as growth is done, and apply a liberal dressing of manure. Plants in the amateur flower garden that are to be kept over for winter's blooming or setting again next year should be taken up and potted early, shaded for a few days and protected from injury by frosts. This is the season of fairs and every wide awake horticulturist has now an opportunity by attending them to lay in a stock of information that can hardly be got in any other way or place. All who can should show something to help out the exhibition and make them interesting for others, as well as post themselves up on the fruits, flowers and vegetables.

WINDMILL IRRIGATION.—J. F. Monson of Sedgwick county, Colo., thus gives his experience with windmill irrigation: "During the extreme drouth of three years ago an idea struck me to construct a reservoir and use windmills and pumps to fill it. I selected the only suitable place on the farm to build the reservoir, which was sandy or rather gravelly, and it was necessary to build it of stone and cement it inside. It was made 80 feet in diameter with 4½ feet walls banked up all around on the outside. I dug two wells as near the reservoir as possible. I had to go 20 feet for a supply of water, so erected two 12-foot windmills. One of them operates a 4-inch double acting cylinder and throws a 2-inch steady stream; the other mill operates a 4-inch single acting cylinder which does not pump so much as the other. With this arrangement I can irrigate about 10 acres of land. I have raised garden stuff, mostly onions, celery, potatoes, and have begun to plant fruit trees and small fruit, and it has thus far paid fairly well on the investment considering my inexperience in irrigation. I feel thoroughly satisfied that with experience and good attendance it will be a paying investment."

HOW TO GET ANNUAL CROPS OF FRUIT.—As a rule apples bear biennially. Where all of one's orchard possesses this habit, he has a flood of apples one season and none the next; thus, he has profit from his orchard but half the time, and every alternate year must either purchase apples for family use or go without. It is doubtless true that the reason for this is, a heavy crop of fruit so exhausts trees that it takes the second year to recuperate. My theory is that if the fruit be all removed from a tree or any of its main branches soon after the fruit sets, that tree or branch will bear the next year. I have proceeded far enough in the experiment to have ocular evidence that the theory is correct, for at this writing I can show a branch of a Baldwin which was stripped of its fruit last June, and the balance bore heavily, and now the branch is full of fruit and the rest of the tree has none. A Seek-no-Further tree, partly stripped two years ago, presented the same feature last season, and continues it this, on alternate sides.

Secretary's Corner.

WHAT FRUIT ARE YOU STORING FOR THE ANNUAL MEETING?—Considerable fruit has already been stored here in Minneapolis for this occasion, and we confidently expect the best show our society has made. What can you do for it? Shipping tags will be furnished on application to the secretary.

PROSPECTS FOR A FRUIT EXHIBIT AT THE STATE FAIR.—As far as known all the usual exhibitors of fruit at the State Fair will be on hand this fall, though some will not be able to show as well as usual on account of hail or, perhaps, frost. Every possible facility will be provided to make it pleasant for the exhibitor, and we are hopeful that the display will equal or surpass that of last year. Shall we not show the State Fair management that we are in the business for the love of it?

PREMIUMS ON FRUIT AT THE NEBRASKA FAIR.—A circular just received from Secretary A. U. Reed, of the Nebraska State Horticultural Society, indicates the large liberality of Nebraska to that interest. The premiums offered this year amount to $1500. In that state the horticultural society has the entire charge of that department of the fair, arranges the premiums, etc., being allowed a lump sum by the authorities for this purpose—I think, by the legislature. The plan commends itself much.

VISITING THE ORCHARDS OF MINNESOTA.—Prof. S. B. Green of the Experiment Station, St. Anthony Park, and Mr. Clarence Wedge of Albert Lea, are making an extensive tour of the state visiting as far as possible en route the more important orchard districts, and taking notes for a full report to be made to the next winter meeting of this society. In a brief sketch by Prof. Green, to be found on a preceding page, he speaks of being at Excelsior, Waconia, Farmington, Lake City, Eyota, Rochester, La Crescent, Hammond and Owatonna. In an excursion now making, other places are being visited, including New Ulm, Albert Lea, Winnebago City, Fairmont, Austin and Faribault.

It has been a long time, if ever, since such a comprehensive tour has been taken in connection with the work of our society, and the detailed report and resultant conclusions will be looked for with great interest. They should be a very safe guide to the prospective orchardist of Minnesota.

As one practical result of this trip Prof. Green will receive some light, perhaps, to guide in his experiment work at the Station, and

Mr. Wedge, as horticultural lecturer in the Farmers' Institute, will be able to give to the people the information it is the obligation of our society to gather for them.

WHAT ARE YOUR NEIGHBORS DOING?—On a preceding page is an account of two short trips by the secretary in the Minnetonka fruit regions. Reference is made to this here only to emphasize the great advantage to the horticulturist of seeing what and how others in his line of work are doing. A few days spent every season in this way will yield large results in accumulated knowledge and renewed zeal. Don't fail to try it.

FRUIT AT THE STATE FAIR.—Have you made your entries for the State Fair? If not, do it now, and make it a point to show everything worthy on your place, and don't be deterred for fear some one may have better. Select the best you have, pack it carefully and be on hand in good season to set it up yourself and your chances are excellent; you will at least get knowledge of the greatest value by contact with the larger and successful fruit growers, who always attend the fair.

SUPERINTENDENCE OF THE HORTICULTURAL EXHIBIT AT THE FAIR.—On account of the press of other matters Mr. Wyman Elliot is unable to give personal attention to this duty, although he has been honored with the appointment, and at his request the secretary, Mr. A. W. Latham, will assume the management as during several years past. Any communications pertaining to this exhibit should then be addressed to Mr. Latham at his office in the city, or, during fair week, to "State Fair, Hamline, Minn." Of course, all entries must be made before the fair opens with the secretary of the fair, Mr. E. W. Randall, and not with the superintendent of this department, a mistake that is sometimes made.

THE SECOND TRIP TO THE ORCHARDS.—Just as we go to press and too late for any detailed report, Prof. S. B. Green is returned from the second trip which he and Mr. Wedge have been making to the orchards, referred to in a preceding note. He comes back full of enthusiasm at the prospects for apple culture in our state. Probably no further report will be made of those excursions till the annual meeting in December, but when presented at that time it will prove, I have no doubt, the most interesting and valuable word which has come to us on this subject in many years. Minnesota is evidently at the threshold of a new era in orcharding. Be sure you plan to attend this meeting.

TOP-WORKING THE APPLE.—Please notice particularly the article treating on this subject, written at my request by Prof. E. S. Goff, of the Wisconsin Experiment Station, to be found on page 336 of this number. It is practical and deserves careful reading.

Titus Day.

FARMINGTON, MINN.

A Life Member.

(For biography see index.)

THE MINNESOTA HORTICULTURIST.

VOL. 23 OCTOBER, 1895. NO. 9.

HORTICULTURE AT THE MINNESOTA STATE FAIR, 1895.

A. W. LATHAM, SECRETARY.

The fair which has just closed was held under auspices altogether most favorable. Good crops throughout the state, successfully harvested, and pleasant weather during the week combined to make this the most successful fair financially and in point of attendance in the history of the State Agricultural Society.

The exhibit in which we are especially interested, that of the fruits and flowers, occupied, as usual, the south half of the agricultural building, and overflowed in its collections of greenhouse plants which were grouped around the central fountain. A view from the gallery at the south end of the hall, belonging to the Horticultural Society, showed this fountain in the foreground occupying the cen ter of the hall, backed by a lusty array of vegetables and grains which made up the eleven county exhibits. On either side of the hall were banks of flowering plants, etc., composing the exhibits of the florists. In the center of the hall the competitive fruits were arranged on three parallel tables, with pyramidal shelves running the length of this half of the hall. On the shelves around the booth before spoken of were arranged a display of apples and grapes, and at either end of the booth on turn-tables were placed the pantry stores contributed by the ladies, while the bread and cake filled to overflowing the glass-covered cases in front. The tables were handsomely decorated along the center, and upper, shelves with fruit pieces and flowering plants contributed by the floral exhibitors.

The exact figures of the exhibit are not at hand, but in the neighborhood of two thousand plates of fruit were shown, comprising, perhaps, two hundred varieties of apples, forty of grapes and a number of varieties of plums—which were not very plentiful in this year's show—three of pears and one of peaches. The fruit shown was in the main very handsome in appearance and up to the maximum in size. The number of exhibitors was about thirty, and included in their list all the principal exhibitors of the past years with the exception of R. C. Keel, of Rochester, whose absence was regretfully noted. Mr. J. S. Harris carried off the palm for the largest professional exhibit of apples, and as he has almost everything, seedling or otherwise, grown in the state, on his place, bearing or coming into bearing, it seems probable that he will continue to wear this highest honor indefinitely.

The leading horticulturists of the state were present in force during the week, and it is this which lends so largely such an interest to the occasion. The premiums secured are always welcome, but the greatest benefit arising from attendance at the fair is the opportunity given for fraternal greeting.

One feature in connection with our portion of this fair should be especially noted, and that is, the attention of the press of the Twin Cities. Heretofore, our exhibit has received scant notice from them, but this year all the prominent papers of the two cities have given considerable space to a description of it and seemed to have suddenly awakened to the fact that the horticultural society is making a fine show and the state is becoming a fruit-growing region. A few extracts from these notices will be worth preserving in connection with this description as showing these sentiments. Some of the articles from which they are taken, were a column or more long, and during the week there were several editorials occupied entirely or in part with the fruit exhibit. The following are the extracts referred to:

"Some forty years ago the first efforts at fruit raising were begun in Minnesota. At that time even the most sanguine did not expect that much would be accomplished in this climate. Today, however, Minnesota boasts the strongest horticultural society in the United States; and it is owing to the public spirited efforts of the state society that the present grand display of fruits is presented in agricultural hall. Last year $700 was allowed in premiums to fruit growers. This year the amount is cut to $500, and yet a very creditable showing is made. A thousand dollars in premiums would fill agricultural hall to overflowing with a fruit exhibit that would astonish the citizens of Minnesota as well as the visitors from the East."—St. Paul Globe, Sept. 11.

"The most beautiful spot in all the enclosed places in the fair grounds is that at the south end of the agricultural building, where Flora and Pomona have been made to do joint duty in making up the ensemble of a scene that is altogether lovely."—Minneapolis Tribune, Sept. 9.

"At the south end of the agricultural hall is a raised platform, from which an excellent view of the building and the displays of fruits and flowers may be had. It is a sight to make any lover of the most beautiful part of the farm and garden feel a supreme satisfaction. On either side of the building there stretch away for perhaps seventy-five feet banks of flowers from the greenhouses of the two cities, while in the center, arranged in pyramidal shelves, show the fruits. And the fruits are there! Any one who is skeptical about the ability of the climate and soil of Minnesota to raise apples should see the fruit on exhibition."—Minneapolis Journal, Sept. 11.

"The royal apple, king of fruits, is destined to add Minnesota to the most flourishing of his dominions. If any one doubts it, let him go to the state fair and see the exhibit in the agricultural hall."—Pioneer Press, Editorial, Sept. 13.

"One of the most tempting and bewitchingly beautiful exhibits is the display made by the Minnesota State Horticultural Society in agricultural hall. It is hard to realize that a state so young could produce such a wonderful variety of fruits of such an excellent quality as is displayed in this exhibit. Rendering this display of fruit more tempting and pleasing is a most beautiful collection of plants and flowers, artistically arranged. Not only are they displayed in groups, but they are also distributed among the fruits, lending to the whole exhibit a picturesque beauty that makes it wonderfully tempting and attractive."—Minneapolis Times, Sept. 13.

"If there is an infant industry in this state that ought to be protected, and which is thriving in spite of the fact that it is handicapped in many ways, it is the raising of fruit. The success of fruit culture is due almost entirely to the fact that the men engaged in it are the people who do it because they love it and are determined to win in spite of everything. They have proved to a demonstra-

tion that the climate and the soil are all right for the more common fruits, and now they are making a noble effort to force recognition from the state agricultural society. And that recognition took the form this year of a reduction of the premiums offered for displays. Any one who has seen and enjoyed the beautiful showing of fruits and flowers in the south end of the agricultural building must feel something of indignation at the fact that all those beauties are competing for a beggarly $500 premium."—Pioneer Press, Sept. 13.

It is evident that the absence of pool selling and in other respects the cleansing of the moral atmosphere of the grounds is bringing into prominence the strictly agricultural elements of the fair which have heretofore occupied comparatively obscure positions. It is not that the horticultural exhibit is better than before that the press have taken so much more notice of it this year,but that ours is becoming in verity an *agricultural* fair. With a continuance of the present wholesome policy we may expect still greater recognition of ours and kindred interests to the great and lasting benefit of the real tillers of the soil.

MULCHING TO RETARD BLOSSOMING.

In order to test the truth of the old theory that a mulch applied when the ground is deeply frozen will, by keeping the frost in the ground and the feeding roots frozen until late in the spring, change the time of blossoming of the trees so treated, we took three sets of trees in our bearing orchard last February and mulched half of each set with litter about ten inches deep extending six feet from the trunk of each tree. The ground was bare at the time and frozen to an unusual depth, and, as the frost came out very gradually this season on account of the lack of usual rains, the ground remained frozen under this mulch long after it had thawed out about the other trees, thus giving opportunity for a very perfect test of this theory. The varieties tested were the Duchess, Wealthy and Whitney, and during this month the mulched and the unmulched trees blossomed freely and at exactly the same time. To add to the conclusiveness of this test we will give an incident in our experience this season, which seems to make it certain that the time of the opening of the leaves and blossoms is controlled entirely by the temperature of the air and is independent of the action of the roots.

While examining a long row of Hibernals that was in bloom we came upon a tree, also in full bloom, that looked pinched and whose foliage was peculiar, and, upon further examination,it seemed to be quite loose in the ground. We pulled on it and, behold, it was only a stub stuck in the ground without so much as a sign of a root. Pocket gophers had been at work under the heavy mulch and had used the roots of that tree to eke out their winter supply. The top of the tree had gone on, and at the bidding of the genial warmth of spring had performed its proper functions without aid or comfort from the roots, and had done it at precisely the same time as the adjoining trees which were enjoying full connection with their roots. Mulching is a good thing to conserve moisture and prevent dry and deep freezing.—*N. W. Agri.*

PREMIUMS AWARDED AT THE MINNESOTA STATE FAIR, 1895.

FRUITS.

GEORGE H. SMITH, LONG LAKE, MINN.

	Prem.	Amt.
Duchess of Oldenburg, apple	2	$1.00

GEORGE MILLER, FARIBAULT, MINN.

Peerless apple	1	$1.50
Collection of seedling apples (excluding Siberians and hybrids)	2	8.00
Collection of Siberian and hybrid apples	1	8.00
Seedling apple, fall variety, never having received a premium at the Minnesota State Fair	2	4.00
		$21 50

A. B. COLEMAN, LONG LAKE, MINN.

Collection of hybrid and Siberian apples	3	$4 00
Borovinka, apple	3	.50
Virginia, crab	1	1.00
Briar Sweet, crab	2	.75
Hyslop, "	2	.75
Florence, "	2	.75
		$7.75

JOHN LOUDON & SON, EXCELSIOR, MINN.

Duchess of Oldenburg, apple	3	$ .50
Virginia, crab	3	.50
Collection of grapes	1	20.00
Agawam, grape	3	.50
Brighton, "	3	.50
Concord, "	2	1.00
Delaware, "	3	.50
Duchess, "	1	1.50
Empire State, grape	1	1.50
Herbert, "	1	1.50
Iona, "	1	1.50
Lindley (Roger's No. 9), grape	2	1.00
Lady, "	1	1.50
Massasoit, "	1	1.50
Moore's Early, "	2	1.00
Niagara, "	1	1.50
Pocklington, "	2	1.00
Pokeepsie Red, "	1	1.50
Wilder, "	1	1.50
Worden, "	1	1.50
Telegraph, "	1	1.50
Cottage, "	1	1.50
Wyoming Red, "	1	1.50
Aminia (Roger's No. 39), "	1	1.50
Martha, "	1	1.50
		$49.00

H. L. CRANE, EXCELSIOR, MINN.

Collection of grapes	3	$10.00
Agawam, grape	1	1.50
Brighton, "	1	1.50
Concord, "	3	.50
Delaware, "	1	1.50
Duchess, "	2	1.00
Iona, "	2	1.00
Janesville, "	1	1.50
Lindley, "	3	.50
Lady, "	2	1.00
Moore's Early, grape	1	1.50
Pocklington, "	1	1.50
Worden, "	2	1.00
		$24.00

DITUS DAY, FARMINGTON, MINN.

Collection of apples (hybrids and Siberians excepted)	3	$8.00
Collection of hybrid and Siberian apples	1	8.00
Malinda, apple	2	1.00
Talmon Sweet, apple	2	1.00
Florence, crab	3	.50
Sweet Russet, crab	2	.75
Martha, crab	3	.50
Early Strawberry, crab	2	1.00
Collection of Siberian and hybrid seedling apples	2	4.00
		$24.75

J. A. HOWARD, HAMMOND, MINN.

Collection of hybrid and Siberian apples	2	$6.00
Duchess of Oldenburg, apple	1	1.50
Wealthy, "	1	1.50
Borovinka, "	2	1.00
McMahon White, "	3	.50
Largest hybrid, "	2	.75
Powers, crab	3	.50
Hyslop, "	1	1.00
Whitney's, crab	1	1.00
Early Strawberry, crab	2	.75
Minnesota, "	1	1.00
		$15 50

SIDNEY CORP, HAMMOND, MINN.

Collection of apples (hybrids and Siberians excepted)	1	$15.00
Autumn Streaked, apple	1	1.50
Anisim, "	1	1.50
Rollin's Prolific, "	1	1.50
Elgin Beauty, "	1	1.50
Winter White Pigeon, "	1	1.50
McMahon White, "	1	1.50
		$24.00

WILLIAM SOMERVILLE, VIOLA, MINN.

Collection of apples (hybrids and Siberians excepted)	2	$20.00
Collection of hybrid and Siberian apples	2	6.00
Tetofsky, apple	3	.50
Longfield, "	2	1.00
Gilbert, "	1	1.50
Red Queen, "	1	1.50
Rollin's Prolific, apple	2	1.00
Rollin's Russet, "	1	1.50
Rollin's Pippin, "	1	1.50
Elgin Beauty, "	3	.50
Winter White Pigeon, apple	2	1.00
Charlamof, "	2	1.00
Malinda, "	1	1.50

Powers, crab	2	.75
Briar Sweet, crab	1	1.00
Florence, "	1	1.00
Sweet Russet, "	1	1.00
Martha, "	2	.75
		$43.00

O. M. LORD, MINNESOTA CITY, MINN.

Talmou Sweet, apple	1	$1.50
Collection of apples (excluding Siberians and hybrids)	3	4.00
Fall variety of seedling apple, never having received a premium at the Minnesota State Fair	1	6.00
Collection of plums	1	6.00
Desota, plum	3	.50
Weaver, "	2	1.00
Cheney, "	1	2.00
Rollingstone, plum	1	2.00
Rockford, "	1	2.00
Wolf, "	1	2.00
Ocheeda, "	1	2.00
		$29.00

ANDREW PETERSON, WACONIA, MINN.

Collection of apples (hybrids and Siberians excepted)	2	$10.00
Anisim, apple	2	1.00
Christmas, apple	1	1.50
Patten's Greening, apple	1	1.50
		$14 00

M. PEARCE, CHOWAN, MINN.

Winter variety of seedling apple, never having received a premium at the Minnesota State Fair; before premiums are awarded in this lot, exhibits of the same varieties must again be examined (by the same committee, if possible,) at the next winter meeting of the Minnesota State Horticultural Society, the apples not having been kept in cold storage	1	$15.00

J. S. HARRIS, LA CRESCENT, MINN.

Collection of apples (hybrids and Siberians excepted)	1	$25.00
Collection of hybrid and Siberian apples	3	4.00
Tetofsky, apple	1	1.50
Wealthy, "	3	.50
Borovinka, "	1	1.50
Ostrekof, "	1	1.50
Antinovka, "	1	1.50
McMahon White, apple	2	1.00
Okabena, "	2	1.00
Talmon Sweet, "	3	.50
Largest hybrid, "	3	.50
Transcendent, crab	1	1.00
Powers, "	1	1.00
Whitney's, "	2	.75
Collection of seedling apples (excluding Siberians and hybrids)	1	10.00
Collection of Siberian and hybrid seedling apples	3	2.00
Fall variety seedling apple, never having received a premium at the Minnesota State Fair	3	2.00
Winter variety seedling apple, etc.	2	8.00
		$63.25

ERICK B. PAUL, WORTHINGTON, MINN.

Okabena, apple	3	$ .50

O. F. BRAND, FARIBAULT, MINN.

Largest hybrid, apple	1	$1.00

JEWELL NURSERY CO., LAKE CITY, MINN.

Collection of apples (hybrids and Siberians excepted)	3	$15 00
Collection of hybrid and Siberian apples	1	8.00
Anisim, apple	3	50
Okabena, apple	1	1.50
Transcendent, crab	2	.75
Whitney's, crab	3	.50
Martha, crab	1	1.00
Early Strawberry, crab	3	.50
Minnesota, crab	3	.50
Winter variety seedling apple, etc	3	4.00
		$32.25

E. H. S. DARTT, OWATONNA, MINN.

Collection of hybrid and Siberian apples	4	$2.00
Tetofsky, apple	2	1.00
Briar's Sweet, crab	3	.50
Minnesota, crab	2	.75
		$4.25

JOHN R. CUMMINS, WASHBURN, MINN.

Longfield, apple	3	$ .50

J. T. GRIMES, MINNEAPOLIS.

Hyslop, crab	3	$ .50

MRS. GEORGE DORRANCE, FARIBAULT, MINN.

Peerless, apple	2	$1.00

CLARENCE WEDGE, ALBERT LEA, MINN.

Longfield, apple	1	$1 50
Elgin Beauty, apple	2	1.00
Charlamof, apple	1	1.50
Peerless, apple	3	.50
		$4.50

B. T. HOYT, ST. PAUL.

Virginia, crab	2	$ .75

E. S. BARDWELL, EXCELSIOR, MINN.

Wealthy, apple	2	$1.00

GUST. JOHNSON, EXCELSIOR, MINN.

Collection of grapes	2	$15.00
Agawam, grape	2	1.00
Concord, grape	1	1.50
Lindley (Roger's No. 9), grape	1	1.50
		$19.00

RUDOLPH KNAPHEIDE, ST. PAUL.

Transcendent, crab	3	$ .50
Collection of grapes	4	8.00
Janesville, grape	2	1.00
Worden, grape	3	.50
Telegraph, grape	2	1.00
		$11.00

M. M. FRISSELLE, EUREKA, MINN.

Brighton, grape	2	$1.00
Delaware, grape	2	1.00
		$2.00

A. H. BRACKETT, LONG LAKE, MINN.

Desota, plum	2	$1.00

MARTIN PENNING, SLEEPY EYE, MINN.

Collection of plums	2	$4.00
Desota, plum	1	2.00
Weaver, plum	1	2.00
New seedling plum, cross of native with domestic, stating parentage	1	5.00
		$13.00

AUGUST WITTMANN, MERRIAM PARK, MINN.

Collection of plums	3	$2.00

FLOWERS.

E. NAGEL & CO., MINNEAPOLIS.

Collection of greenhouse and hothouse plants	2	$25.00
Collection of climbing vines, five varieties	3	.50
Collection of five hanging baskets, one of a kind	3	.50
Collection of tuberous-rooted begonias	1	2.00
Single specimen palm	1	3.00
Tuberous-rooted begonia, single	1	2.00
Tuberous-rooted begonia, double	1	2.00
Collection of tri-colored variegated geraniums	3	.50
Twelve carnations in bloom, not less than five varieties	3	1.00
Collection of cut flowers in design	1	10.00
Asters	2	2.00
Gladioli, twelve distinct colors	1	3.00
Carnations, ten varieties	1	3.00
Twelve-inch basket of flowers	1	5.00
Pyramid bouquet	3	1.00
Hand bouquet	3	1.00
Bridal bouquet, white flowers	1	3.00
		$84.50

WESSLING & HARTMANN, MINNEAPOLIS.

Collection of greenhouse and hothouse plants	3	$15.00
Collection of climbing vines, five varieties	2	1.00
Collection of five hanging baskets, one of a kind	2	1.00
Collection of coleus, six or more varieties	1	2.00
Geraniums in bloom, ten varieties	2	2.00
Collection of tri-colored variegated geraniums	1	2.00
Twelve carnations in bloom, not less than five varieties	2	2.00
Asters, assorted colors, not less than ten kinds	1	3.00
Dahlias, assorted colors, not less than ten kinds	1	3.00
Pyramid bouquet	1	3.00
Hand bouquet	1	3.00
		$37.00

R. J. MENDENHALL, MINNEAPOLIS.

Collection of greenhouse and hothouse plants	1	$30.00
Collection of foliage and decorative plants	1	15.00
		$45.00

F. G. GOULD, EXCELSIOR, MINN.

Carnations, ten varieties	2	$2.00
Twelve-inch basket of flowers	3	2.00
		$4.00

JOHN C. FLEISCHER, ST. PAUL.

Collection of foliage and decorative plants	3	$5.00
Collection of climbing vines, five varieties	1	2.00
Collection of five hanging baskets, one of a kind	1	2.00
Geraniums in bloom, ten varieties	3	1.00
Collection of tri-colored variegated geraniums	2	1.00
Twelve carnations in bloom, not less than five varieties	1	3.00
Collection of cut flowers in design	2	5.00
Roses, six varieties	2	2.00
		$21.00

JOHN VASATKA, MINNEAPOLIS.

Collection of foliage and decorative plants	2	$10.00
Collection of coleus, six or more varieties	3	.50
Collection of tuberous-rooted begonias	2	1.00
Single specimen palm	2	2.00
Tuberous-rooted begonias, single	2	1.00
Tuberous-rooted begonias, double	2	1.00
Geraniums in bloom, ten varieties	1	4.00
Collection of cut flowers in design	3	3.00
Asters, assorted colors, not less than ten kinds	3	1.00
Gladioli, twelve distinct colors	2	2.00
Carnations, ten varieties	3	1.00
Roses, six varieties	1	3.00
Pansies	2	2.00
Twelve-inch basket of flowers	2	3.00
Pyramid bouquet	2	2.00
Hand bouquet	2	2.00
Bridal bouquet, white flowers	2	2.00
		$40.50

MRS. WILLIAM LYONS, MINNEAPOLIS.

Collection of currants	1	$2.00
Collection of strawberries	1	3.00
Collection of raspberries	1	3.00
Collection of house plants in pots	2	3.00
Collection of geraniums in bloom	2	2 00
Collection of foliage plants, five varieties	1	3.00
Hanging baskets, a pair	1	2.00
Climbing vines	1	2.00
		$20.00

MRS. A. S. BABCOCK, ST. ANTHONY PARK, MINN.

Collection of house plants in pots	1	$5.00
Collection of coleus	1	2.00
Collection of fuchsias in bloom	1	3.00
Collection of geraniums in bloom	1	3.00
Collection of foliage plants, five varieties	2	2.00
Hanging baskets, a pair	2	1.00
Climbing vines	2	1.00
		$17.00

MRS. G. E. COOPER, ST. PAUL.

Pansies	1	$3.00

THE LAW OF COLORS.—Etta M. Budd, in a contemporary, has an able article on the law of colors, illustrated by a diagram, which is copyrighted, showing the relationship of colors and the relative proportion of each in the plant and its flowers. A true definition of colors has long been wanted, for who can tell us what a red, scarlet, purple or yellow flower is? Red may, with a degree of propriety, be applied to a crimson or scarlet flower, of which there are shades innumerable. Light or dark are applied to primitive colors to give something of an idea of the color or shade, when an unknown variety is described. Mr. S. B. Parsons, of Flushing, N. Y., has for years advocated the arrangement of a scale of colors for the use of florists, so that when a flower was described in point of color the buyer would know just what he was getting—*Florists Exchange*.

Vegetables.

REQUIREMENTS FOR CRANBERRY GROWING.

H. C. LEONARD, M. D., MINNEAPOLIS.

There seems to be at present a slight revival of interest in the subject of cranberry culture in Minnesota. It seems strange that a state which has the capability to grow cranberries to the extent that is true of Minnesota, should have done so little to develop it. If as great efforts were put forth here as in Wisconsin, we certainly could produce as many berries and of as good quality as they have done. While the literature of the subject has become quite considerable, it is, nevertheless, so very much scattered throughout the reports of different horticultural, agricultural and cranberry grower's societies, and different horticultural and other journals, as to be practically inaccessible to very many of our people. To those who already perfectly understand the subject, this paper is not specially addressed, neither does the writer presume to cover the whole subject, but rather to try to excite intelligent interest and experiment on the part of those who may have some facilities for growing a supply of this very wholesome fruit.

About twenty years ago there was some discussion of the subject of cranberry culture in this society by O. F. Brand, of Faribault, and Seth Kenny, of Morristown, and others; but the most exhaustive discussion was contained in a paper read by Rev. J. E. Wood, of Detroit, Minn., published in the proceedings of the winter meeting held in St. Paul in January, 1875. As to other literature, I would recommend "White's Cranberry Culture," written from a New Jersey standpoint, and "Cranberry Growing," by James Webb, of Cotuit, Mass., published by the Orange Judd Co., of New York, which, together with the reports of the Massachusetts Horticultural Society, a complete file of which may be consulted at the Experimental Farm at St. Anthony Park, will give a good idea of the subject as they have developed it in Massachusetts. The reports of the Wisconsin Cranberry Grower's Association would give one some idea of what they have been doing in that state. Our climate being so nearly identical with that of Wisconsin would indicate the experience of Wisconsin growers as particularly well worthy of our study.

When we observe how the wild cranberries grow, we will notice that they require a good supply of moisture. We find them growing, almost invariably, in wire grass marshes or mossy peat bogs. We do not find them where there is a good sod and a good growth of valuable grass for hay. They grow above the water in the bogs, sending their roots down into the peat where it is either very moist or standing full of water.

Here one thing should be well noted. A peat bog such as wild cranberries usually grow in, contains very little plant food in a condition to be assimilated. It is really very poor land. If you don't

believe it, try draining off the surplus water and sowing redtop or timothy seed, either of which will not grow to produce a crop of hay good for anything until the bog has had time to settle down and rot, which often takes many years. After you get such a bog to rot, it is good hay land. A piece of land in condition to produce, a good crop of hay will not do to grow cranberries. Mark this well.

The cranberry, like its near botanical relative, the *blueberry, finds its most congenial home in a really poor soil. A failure to note this fact has been at the bottom of many an expensive and aggravating failure in trying to cultivate cranberries. It is true that many of the most successful and profitable cranberry farms in the country have been made out of good hay land; but only by rendering it artificially poor, especially at the surface, by smothering it with several inches of sand. Where the soil is in condition to grow a good crop of redtop or timothy, cranberry vines will either grow too rank and produce few or no berries, or else grass will choke them out. Neither will they grow in a soil that has any clay in it. It must be either a pure vegetable mold and sand, *i. e.*, a black sand, or undecomposed peat. It is only in the unrotted peat that we find them growing wild, but if properly supplied with water a black sand is quite as good, if not better. A very light covering of pure sand on a black sand will suffice, whereas, it requires several inches, even as much as a foot, sometimes, of pure sand to properly prepare rich vegetable mold so as to produce cranberries instead of hay.

Cranberries must, in all cases, be irrigated, if they are growing in land that is not already wet. They must be so situated that they can be completely covered with water all winter, and so they can be quickly covered at other times to protect them from the ravages of certain insects and from late spring, summer and early fall frosts, for the best success.

Neither must there be too much lime in the soil in which they grow in which respect they again resemble their relations, the blueberries. Neither cranberries nor blueberries thrive in a strongly lime-impregnated soil. This may be the key to certain failures in cranberry plantations in Wisconsin and other parts of the Northwest, viz., too much lime in the sand or water used, or too much in the soil generally. Lime promotes the growth of grass but is iminical to the growth of the cranberry, the same as clay. Here we see it crops out again, a grass soil is not a cranberry soil. Now I know there are a very great many quite productive wild cranberry bogs nearly all over the southern half of this state where surrounding lands are of clay strongly impregnated with lime, and most excellent grass or grain lands; but it may be invariably noticed that these cranberry bogs are of peat built up of wire grass roots and sphagnum moss of a considerable depth and without any admixture of the surrounding clay soil, their situation being such that the soil and clay washed from the surrounding high grounds can none of it ever be lodged there. It will also be found that water in such a

*The cranberry bears about the same botanical relation to the blueberry that the blackberry does to the dewberry. It is of the same genus but of a different species.

cranberry bog is never very hard, and commonly quite as soft as rainwater. Likewise, water used to flood a cranberry farm should not be very hard and never muddy, nor have any clay in suspension; otherwise, the cranberries will most likely fail.

Many growers in Wisconsin will tell you point blank that it is not necessary to sand a cranberry bog in that state like they have to do down on Cape Cod and other places in the East, and in proof of this will call to your attention scores of profitable cranberry bogs on which no sand has ever been used. Upon making a careful examination, however, it will be found that these bogs are of nearly or quite pure undecomposed peat, and, so long as they are kept wet enough so that little decomposition takes place, they will remain fairly productive, but let them rot enough to set free from the peaty mould a considerable amount of plant food in an assimilable condition, and you will find them surely and literally "going to grass." Any farmer who has a wire grass peat bog or marsh which he can arrange to flood at will can raise cranberries, and often quite profitably, even though there may be no sand available.

If the piece can be drained dry enough to break it up, so much the better; if not, it can sometimes be turned pretty deeply and evenly with a breaking plow just at the time in the spring when it has thawed six to ten inches deep. The sod thus turned may be pressed down with a heavy roller and is then ready to plant. Of course, if it cannot be drained, the plowing and rolling will have to be done before it has thawed too deep, else the team will get mired. There are thousands of acres of worthless wire grass peat marsh in this state that could be made valuable in this way.

In case the water can not be found at a higher level than the peat bog itself, one part of the bog may be enclosed by an embankment, or dyke, of sods from the necessary ditches reinforced by clay hauled from the outside, to be used for a reservoir, while an adjoining portion may be in like manner enclosed to be planted with cranberries. The necessary water may be pumped by windmill or windmills into the reservoir, for use when needed. One good sized windmill will pump a large amount of water three to five feet high in a season. This would do for a small cranberry patch and might in some cases, no doubt, be made to pay quite well.

To enter into cranberry growing for a business, however, it would certainly be better to get your water onto the cranberries by gravity and select a place where sand is available. Quite coarse sand is more likely to be free of clay than very fine and, therefore, is more desirable. In some parts of this state the sand beds have considerable finely broken limestone in them, which might render them unsuitable for a covering for a cranberry bog. This may be easily determined by dropping some sulphuric acid (oil of vitriol) on the sand. If it effervesces, there is too much lime there. If there is much bog iron in the sand used, that may cause a failure too. As already pointed out, in some cases the sand may be dispensed with, but the water never.

CRANBERRY CULTURE.—(A TALK.)

A. D. LEACH, EXCELSIOR.

Mr. Leach: Mr. President, ladies and gentlemen: Cranberry culture is something of a hobby with me. I live up near Lake Minnetonka, and I have a cranberry marsh there. There are a great many marshes in that vicinity that used to be very productive, but they have been neglected, and cattle have been permitted to run over them a good many years, and they are run down, and the majority of them are not worth anything. About fifteen years ago, I bought a piece of land near Lake Minnetonka, on the shores of Lake Minnewashta. The land contained a small cranberry marsh, about two acres, and I determined to see if that marsh could not be reclaimed. My object in speaking on this subject here tonight is to see if I cannot encourage other people who have cranberry marshes in the vicinity where I live and in other parts of the state to improve those marshes, for it is a fact that mine has paid me better than any other part of my farm. This year I obtained more clear profit from the two acres of cranberry marsh than I received from all other sources of income from my farm, including my small fruits and vines. I know there are hundreds of acres within a radius of three miles of my place that are just as good cranberry marshes as mine. The simple thing that has ruined these marshes is that people have neglected them and have allowed cattle to run over them, consequently they are no good, and it seems almost impossible to make them believe that they are of any value.

I fenced my marsh about fifteen years ago, about the time I bought the land; I ran a fence around the marsh, and then I concluded to burn it over. The first year I did not get anything from it, but the second year I picked nearly a hundred bushels of cranberries from the two acres, and the third year I picked about half as many; the fourth year I got a full crop, and for seven years the marsh paid me at least $100 per acre net profit. In 1890, it had partially run down again. It had become filled with an underbrush of birch, and the grass had grown up around that until it was not doing very well, but still it paid me better than any other part of my farm. I burned it over again, and it burned very hard, in fact, it burned the vines all up. It was so severely burned that for two years I did not get any crop. The third year I got a fair crop, and this past year from the two acres we picked 150 bushels. At the prices for which we sold those cranberries we made a net profit of $260 from the two acres. My object in calling this matter up before the horticultural society is that this society might encourage those who own marshes to develop them, and such men would soon realize that a one acre cranberry marsh was of more real practical value than any other ten acres of land they had in their farms.

DISCUSSION.

Mr. Brown: How do you start the cranberry marshes?

Mr. Leach: I do not know. We have cranberry marshes all over the state, but I do not know how they are propagated.

Mr. Dartt: How about the water? Where is your marsh?

Mr. Leach: My marsh lies on the shore of a small lake. The soil is only good for cranberries; it is totally valueless for anything else.

Mr. Dartt: Is it too wet for hay?

Mr. Leach: It is too wet for hay; it would only grow a very thin crop. It is about a foot above the lake and the marsh will fill up in the spring. About the middle of June I let the water run off, and the cranberries come in blossom from then to the 10th of July, and I always thought until this year that after that time it was necessary to have the marsh wet all through the season. I found, however, I was mistaken; the marsh from the middle of July up to the time we picked the cranberries was perfectly dry.

Mr. Dartt: Is it covered with ice in the winter?

Mr. Leach: Yes, with ice and water.

Prof. Pendergast: Did you ever try covering with sand?

Mr. Leach: I never did, but I have a neighbor who hauled some sand to cover his marsh. I never made any improvements in my marsh except to put a ditch through it to hold the water, damming it up to hold the water on the marsh. There is no expense at all connected with it except the picking.

Mr. Brown: Could we secure vines of you?

Mr. Leach: Yes, if you know how to set them, but I do not how know to set them That is the most important thing I came here for. I want to know, to find out how to transplant them. I have heard a good many theories.

Mr. Pearce: There is a marsh near me of about thirty acres that is produced from a big spring in the center. This marsh is covered with cranberries. There have been a large amount of cranberries picked some years, but the trouble is to overflow it. Could it be overflowed.

Mr. Brown: How high is it above water.

Mr. Pearce: It is fifty feet above Lake Minnetonka.

Mr. Leach: Is there any outlet?

Mr. Pearce: Not a bit.

Mr. Leach: All you could do, so far as I can see, is to hold the water that is already there.

Mr. Pearce: It seems to be greatest in the spring. In the middle there is a spring that never freezes. This spring will overflow twenty acres; yes, it will flood thirty acres. There is one thing, at the same time there are any amount of cranberries.

Mr. Leach: Are cattle allowed to run in that marsh?

Mr. Pearce: Not any. Can it be improved?

Mr. Leach: I see no way of improving the marsh if there is no outlet. Most of the marshes, by damming up the outlet, can be readily overflowed until May or June, and this can be done even in our driest seasons. I hope this society will report this matter and try to agitate it until something is done. I know we have many thousand dollars worth of cranberries in this state, if the marshes receive the proper attention.

MELONS ON SANDY SOIL.

L. H. SCOFIELD, BLOOMINGTON.

I am not going to pose before this society as an expert in melon culture, for while my experience in raising melons to eat extends back to the dark nights of my boyhood, I have raised melons for market only during the last six years. Our soil, as the title of this article implies, is a sandy soil varying from a rich sandy loam with a heavy clay subsoil to a light sand with hardly a trace of clay in the subsoil. This last is our best melon ground, producing in any sort of a year a greater quantity and melons of much superior quality to those raised on richer and heavier soil.

We plow early in spring to start the weeds and plow again about May 10th. Mark the ground one way with a marker six feet for watermelons, five feet for late muskmelons and three feet for early muskmelons; mark the other way with a team and large single shovel plow furrows six feet apart. This makes the checks six by six, five by six and three by six. Into the furrow at the check, we put a large scoop-shovelful of fine, well rotted manure, working it well into the soil with a spading fork, leaving the hill level with the ground. In this hill we plant eight or ten seeds, being careful to tramp the ground firmly over the seeds. Given good seed, this tramping does more to insure a good stand of plants than any one thing. Last summer during the dryest time, when the ground seemed like an ash-heap, by insisting on the tramping process we got on half an acre of cucumbers a stand, without one missing hill.

As soon as the seeds are planted and before they have time to sprout, we drag the ground with a light slanting-tooth harrow, being careful to have the team straddle the rows. This smoothes and fines the ground so that no crust forms on the hill. As soon as the plant unfolds its leaves, each hill is dusted with a handful of finely ground bone meal and land plaster. This stimulates the plant, drives off the striped squash bug and makes the row so we can see to follow it with the sulky-cultivator. Thin to four plants in the hill at the second hoeing, and keep the ground mellow and free from weeds, as no one can raise a good crop of melons in a weedy field. We aim to do as much of the work with a team as possible, avoiding all the hand work we can.

As soon as the seed is planted, the trouble begins. We fight striped squirrels, field mice, white grubs, cutworms, striped bugs, frost, weeds and two-legged marauders. Shoot the squirrels, use squash-seed loaded with strychnine for field mice, dig out cutworms and pinch off their heads, going over the whole field every morning for several days in a bad season. If there is possible danger of frost, cover each hill with a handful of straw and leave it on until the weather moderates. A man will cover a good many acres in half a day.

Varieties. Avoid too many varieties. Two or at most three varieties of muskmelons and as many of watermelons are enough. One extra early, one late with, perhaps, an intermediate variety to provide a close succession. The best early muskmelon I have not found yet. We have grown Netted Gem, Emerald Gem, Orange, Christiana and White Japan. The first three are too small and soft; the last two inferior in quality. The Osage is all right for the medium and late market, though in a wet year it cracks badly. On sandy land it is first quality, good size, neither too large or too small, and with good care it is an extra good cropper.

With us the Peerless (seed from W. Atlee Burpee) stands first as an early watermelon from, perhaps, a dozen varieties tried. This strain of Peerless is a large, oblong melon, and is an extra good handler, not easily broken, and will not grow hollow-hearted if kept a few days. Our main crop is Seminole. In season it ranges from medium to late. It is of extra good quality and good size; specimens last year weighed forty-two pounds. It is a fair shipper. Its greatest objection is its light color. I am trying to grow it with a darker skin.

We try to raise most of our seed, once we have decided upon a variety. By being careful to keep varieties separate, and taking seed from only choicest fruits, even the best varieties may be improved from year to year.

We have a small space which we call our trial grounds, and in this we raise a few new varieties each year. As a result of our experiments last year, we shall plant a trial field of one acre of Melrose muskmelons, as I believe it to be a gem, judging by a single year's experience.

Drainage is an important item in the culture of all plants. All sorts of coarse material are used for this purpose, but bits of broken charcoal are better for this purpose than anything else, because it helps to keep the soil in the bottom of the pot sweet and healthful. The smaller sizes of pots will need only a few pieces scattered over the bottom; three and four inch pots require an inch of drainage, and five and six inch sizes and upward, two inches and more according to their depth. A layer of moss or cocoa-fiber should be placed above the drain to keep the soil from washing down into and clogging it.

GARDEN VEGETABLES---A GREATER VARIETY AND CHOICER KINDS.

C. L. HILL, ALBERT LEA.

When you visit the garden of the average farmer, you are less apt to be struck with what you find there than with what you fail to find. The thing likely to impress you is the fact that any one should be willing to do without so many vegetable luxuries that might be growing in abundance at his door. The great need of our gardens is a greater variety and choicer kinds.

Every year,early in their season, we see piles of tender asparagus, green onions, lettuce and radishes at the market places for the use of the town's people. But do our farmers have them in abundance? We who till the soil are surely entitled to its best gifts, and are in position to obtain them so much easier than are our city friends, and may have them in so much fresher, better condition.

The cabbage is so common that it has become a prominent feature in the sameness of the garden patches along the country roads; but its cousin, the cauliflower, a much superior vegetable, is rarely seen there. Yet it is a hardy plant, and we may have it in all its crispy freshness for the simple outlay of a few hours of labor and the expense of a few seed. Yes, the seed are high-priced I know, and that is the bugbear with some of us. But a few seed go a long ways,and what are left over are good for the next year.

Egg plant is almost unknown in the farm gardens of Minnesota, but for no good reason that I am able to see. The Early Dwarf Purple will mature in this climate and be ready for the table by the first of August. It thrives in our rich soil and yields abundantly. It is a plant, too, that will stand a good deal of drought—a thing in its favor we are all prepared to appreciate. We may save our own seed, so the expense is only that of labor after getting a start.

The varieties of beans for the garden are almost numberless. Among them all, none is superior to the rich limas when taken fresh from the bush. If too much trouble to get poles for the running varieties, we now have three or four limas that need no poles. The largest of these, Burpee's Bush lima, is really a fine bean. It needs a season rather longer than ours in which to do its best; but I have had no difficulty in getting the beans to ripen perfectly for seed, during the past three years. Henderson's Bush lima is a smaller bean; but I believe it to be somewhat hardier and a few days earlier than Burpee's.

The ground cherry finds place in some of our gardens only as a troublesome weed. But there is an improved variety that yields a fine fruit, and which it pays well to cultivate. Here is a vegetable fruit well adapted to our climate and one worthy of attention and improvement through our horticultural society.

The different kinds of melons do not receive half the attention they deserve. Hundreds of car-loads are shipped into our state every summer, when we might easily grow our own melons. To me there is no great degree of satisfaction in the large, coarse-grained melon that was picked green and has been shipped one or two hundred miles, bruised in handling, broiled in the sun and held in

dealer's hands until the germs of decay and even of disease, have established a foothold. At the side of such, place a few of our choicest home-grown melons, fresh from the vines and make a test of their comparative merits. Then see if you do not wish that the Southern melon, which cost you near the price of a bushel of wheat, had fallen into the hands of some friendly darkey (instead of a shipper), and that you had grown a hundred melons where the bushel of wheat was harvested.

There is constant improvement going on in the line of vegetables, as well as elsewhere. We are too apt to set our heart on some old variety and cling to it until the wide-awake portion of the world has passed far ahead of us with something better. It is to our interest to keep an eye open for new things, and to make an occasional trial of them, even if they do not turn out exactly as the seedsman's colored plates represent them.

It costs so little in either time or money to test a new vegetable. It is quite different from putting money into unknown trees for an apple orchard, where years of care and waiting must pass before the result is known. Of course a feverish haste to grab at everything advertised as a novelty might be as bad as getting into the narrowest of ruts. It is only a wisely discriminating outlook for better varieties that is here recommended, where it may take the place of an oyster-like contentment with inferior things.

VEGETABLES.

WM. LYONS, MINNEAPOLIS.

As a whole, 1894 was a very disastrous one for market gardeners in the vicinity of the twin cities. April was very wet and warm, as was also the first ten days in May; the land was so wet it was almost impossible to sow seeds, and much of it was sown in the mud. About May 15th, the weather cleared off, and it became very warm, dry and windy. The land dried up very rapidly, and became so hard that it was almost impossible for the young plants to push through. As soon as the land could be worked, I commenced to plant about thirty-five acres of potatoes. The first planting was the best. I used the Aspinwall planter. Several farmers were using the same planter from one to two days a week according as they were ready to use it; in this way my planting continued for about three weeks.

The first ten acres yielded ninety bushels, the second planting about sixty, the third planting forty bushels per acre; all were planted alike, the same kind of seed and cultivation. I harrowed several times before they came up and once after, used a Planet, Jr. cultivator and worked the potatoes as nearly level as possible.

It continued hot and dry for about four months—only twice in that time did rain enough fall to lay the dust for a few hours. In some places local showers did lots of good, but I did not happen to be in it. The result was a partial failure of nearly all vegetables, and in some instances a total failure.

I think the Early Ohio has stood the drouth the best in this section and would plant it in preference to any other variety with which I am acquainted now, either for a wet or dry season, for early and Burbank for late.

Produce has been shorter in supply than any other lines in the hands of commission men; the drouth cut down the receipts of home grown vegetables and lowered the grade. This had the effect of increasing the amount of vegetables shipped from other states and the shortage of potatoes have been fully made up by shipments from the Western states, even Manitoba shipped to this market about three hundred carloads. When these potatoes were put on the market, home grown would not sell for hardly anything. The commission houses did a large and a profitable business,which is more than I can say for the gardeners and farmers. The drouth and heat had been so terrible that the average yield in this locality is not over thirty bushels per acre; many fields were not worth digging. It is the greatest failure known since the state was first settled. From July first to September first a walk in the early morning along the market streets of the twin cities revealed the fact that three-fourths or more of the wagons were loaded with Early Ohios all showing very plainly the marks of the drouth—only about five per cent were of fair size and quality. About September first it was noticed that some of the tubers had a black spot or streak in the center—those raised on a poor sandy soil being most effected. On rich loamy soil not over five per cent were affected, but that was enough to spoil the sale, for no family would buy any until they cut all the big nice ones in a bushel, and, if one black one was found,there was no sale. All the early varieties were more or less affected; late varieties were not affected at all, but were so small and inferior that they would not sell. I hope this black streak in the Early Ohio has not come to stay; if it has we will be obliged to discard the best real early potato I have ever known. I was very much surprised on entering the horticultural hall at our state fair to see such a fine exhibit of vegetables; in quality the display was creditable but not as complete as and in many respects not equal toformer years. The varieties coming nearest the usual standard of excellence were tomatoes, squashes, melons, pumpkins, rhubarb; potatoes, rutabagas, turnips, cabbages, beets, onions were rather inferior in growth and quality. Though grasses and other shallow-rooted vegetation succumbed to such fierce conditions, the wonder was that any vegetation at all survived; but considerable of it did, and, though considerably stunted, the staple crops were not failures by any means; in fact, wheat was very generally up to the average.

UNCOVERING BULBS.—Remove the manure or leaf mulching from all bulb-beds, or better still remove the rougher part and let the finer portion remain. If the plants have been pushing up through the mulching and their leaves have got bleached, to remove the mulching suddenly will be to detroy the whitened foliage; better remove the mulching and as you proceed scatter some straw thinly over the bleached plants, or tree branches will do.—*Gardening.*

REPORT ON VEGETABLES.

J. R. CUMMINS, WASHBURN.

In the way of profitable cultivation of vegetables for 1894, there will be little to report; owing to the dry weather from May 26 to September, along with the great heat, at times from 90 to 100°, vegetables were generally an almost entire failure. Early cabbages from seed sown in hotbed in April, made small heads in October. Peas sown very early made some crop; sown later, were badly damaged by the drought and hot weather. The pea bug or weavil is not often found in the seed in this state. The bug can be destroyed by leaving the peas infected in a building where zero weather can reach them. Onions from sets did fairly well; but from seed the growth was small. In dry seasons it is more profitable to grow the onion from sets.

Asparagus, for a time in May, made a heavy growth. So much was in the market at times, that when sold it was at a price the lowest ever known. In growing asparagus, straw should be spread over the bed and burned in the spring or fall. There is no vegetable grown at less expense than the asparagus; a bed once planted, with cultivation, will practically last for years. I have under cultivation asparagus from seed sown in 1857, thirty-seven years ago, which yielded as well as beds planted fifteen or twenty years ago.

Potatoes were very early where they were not injured by the frost of May 19th. Vaughan's Early blossomed June 2d. Among early varieties Gregory's Six Weeks was the largest; the Ohio yielded the least, was later and more injured by the scab than other early varieties. Carrots were fair in certain locations, being better on higher ground than on lower. The Guerende, or Ox Horn, and the Danvers are probably the best varieties. In the cellar, in winter, the carrot very often is infected with a rot; the only remedy that I know of is to handle over the roots, and sort out all rotten or partly so. The Edwards' beet is one of the best varieties for table use.

How far it may be profitable to secure our garden seeds from other states is a question that only a fair trial can settle. The state experiment farm might do something to decide this. There is not much doubt, however, that the law of improvement of plants and fruits is that varieties are often made better by cross-fertilization and also by change of seed.

While the other beans made a very light crop, the lima yielded well, when not growing among trees. In growing the lima bean, the rows must be four feet apart, and the hills three or three and one-half feet apart. The bean must be planted with the eye down, and the upper part of the bean but little below the surface; four beans to the hill. Planted in this way the seed, when good, will always grow; planted as other beans, ten to twenty-five per cent might grow. The seed grown here, I find, will nearly always grow, while that from the East will often fail. While the lima must have good cultivation and soil, great care must be taken in the use of manure, on account of the vine being very susceptible to the rust. If the weather in June is wet and cold with sudden changes, the rust may appear, but with warm weather it disappears. Old, well decayed

manure could be used in the spring, but that from the stable if spread in the fall or winter would have better effect. I would not advise the use of manure from the hog-pen.

As soon as the vine makes the first start to run, poles six or eight feet long should be set up at an angle, so they cross four feet from the ground. They should be set at least one foot in the ground, and leaning over the hill. Cultivate at least once a week, and hoe two or three times. When they come up, look after the cut-worms, which are sometimes very destructive. Probably the use of bone or sulphates spread on the ground while cultivating will increase the yield. The lima bean will succeed better on sandy loam, with a well drained subsoil; and yet the surface soil must be of sufficient depth to hold moisture. On clay lands the lima will do well in most seasons, but it must be understood that the vines do not yield many pods until September, and in many localities there are sure to be frosts by the first or middle of September, when in more favored districts, such as near large lakes, or when elevated and well drained and protected from northwest winds, there may be no killing frosts until October. With me the lima vines were not killed until October 17th, though we had frost September 24th, with mercury at 36° four feet from the earth.

The dwarf varieties of the lima are not so profitable as the pole. Henderson's Dwarf yields the most and is the earliest. Dreer's is next in yield, later, but of better quality. Burpee's has never done well here, being very late. None of the true lima dwarfs are so early as the tall lima. The King of the Garden is one of the largest of the limas, and a heavy bearer; Early Jersey very early; Dreer's, or Potato, is one of the best in quality, but late; South Carolina very early, heavy bearer, but small; Burpee's Black and Jackson's Dwarf would, no doubt, be better adapted to general cultivation. They are earlier, but quality not quite so good as the true lima.

OUTDOOR HERBACEOUS PLANTS.

L. R. MOYER, MONTEVIDEO.

Now-a-days the tendency is toward depending almost wholly on hardy plants for the flower garden and the border. It is a healthy tendency. Many of our wild flowers are very beautiful; and that it is becoming the fashionable thing to plant and cultivate them ought to be a matter of rejoicing to every right thinking person.

However, to us who live out in western Minnesota, some of the advice given about planting them will have to be taken with some grains of allowance. The settler on the prairie will not appreciate the advice given him to plant asters, sunflowers, blazing stars, golden-rods, Boltonias, cone flowers, heleniums, artemisias and coreopsis.

These plants are too common, and become tiresome through endless repetition. No unprejudiced observer could fail to testify, for example, to the great beanty of Aster multiflorus, or Aster paniculatus or Aster ptarmicoides, but the traveler on the prairie who sees

thousands and thousands of specimens in a day's ride would hardly advise the planting of more of them. The aster-like Boltonia is a beautiful plant and would look well planted in front of a dark shrubbery, but one who has seen acres and acres of it on the prairie meadows would scarcely care to dig it up and remove it to his door-yard.

Fashionable plant dealers will tell you that Maximillian's sunflower is elegant, and they will be right, but one who every autumn day sees the landscape yellow with it for miles and miles would scarcely care for more or take the trouble to plant it.

The golden-rod has been adopted by some states as the state flower. The plant dealers will tell you that the golden-rod, known to botanists as Solidago rigida, is the finest of its class. The prairie farmer, if he listens at all, will smile with incredulity and think it strange that anyone could call those stiff, yellow weeds in his pasture beautiful.

No one will question the beauty of the blazing stars, and we are glad that they are cultivated and appreciated in Eastern gardens. The prairie meadows are gay with Liatris pycnostachya and Liatris punctata, while on bluff-sides and prairie knolls Liatris squarrosa and Liatris scariosa unfurl to the breeze their purple banners. No farmer on the prairie will remove these plants to his flower border, nor will he care much for the equally beautiful Petalostemon violaceus and Petalostemon candidus. These plants are all too dreadfully common and plebian.

The purple cone-flower (Echinacea Angustifolia) is looked upon as a rare and curious plant in Eastern gardens, but who ever saw one in a garden in western Minnesota? Helenium autumale, Coreopsia palmata and Lepachys columnaris are all interesting plants and in the East are appreciated, for they are away from home there and not common.

The Eastern landscape artist will tell you to plant artemisia in proper locations, but no one who has crossed the plains and become well acquainted with the sagebrush in all its desolate grayness would ever plant artemisia on the borders of his prairie lawn.

The fact may as well be confessed that no person has ever moved from a well improved country where gardens are common out on a new prairie farm without experiencing at one time or another a feeling of homesickness. The monotony of the vast stretches of prairie will at times have weighed down his soul, dwarfing and belittling the man, or making him discontented and rebellious. In such a state of mind, it would be idle to expect the settler to admire the prairie flowers. Something else must be planted in the flower garden back of the prairie lawn. What shall it be?

I would plant hardy perennials. Among the early flowering plants there is nothing better than the old fashioned bleeding-heart. (Dicentra spectabalis). It is perfectly hardy. I would plant pœonias, all the herbaceous varieties, as many as I could afford to buy, not forgetting the old fashioned red ones.

I would plant German iris in profusion and in all its many varieties, remembering, however, that the family resemblance among

them all is very striking, and that the old cheap varieties are as good as any of them. The dwarf irises are very satisfactory, too. You cannot well have too many daffodils—even though they need a little winter protection. The old fashioned yellow daffodil, called by florists, narcissus Van Sion, is one of the hardiest and best. It was this plant I believe that Wordsworth had in mind when he wrote:

"I wandered lonely as a cloud,
That floats on high o'er vales and hills,
When all at once I saw a crowd—
A host of yellow daffodils,
Beside the lake, beneath the trees,
Fluttering and dancing in the breeze.

Continuous as the stars that shine
And twinkle in the milky way,
They stretched in never ending line
Along the margin of a bay:
Ten thousand saw I at a glance
Tossing their heads in sprightly dance.

The waves beside them danced, but they
Outdid the sparkling waves in glee:—
A poet could not but be gay
In such a jocund company!
I gazed and gazed but little thought
What wealth the show to me had brought.

For oft, when on my couch I lie
In vacant or in pensive mood,
They flash upon that inward eye
Which is the bliss of solitude,
And then my heart with pleasure fills
And dances with the daffodils."

The perennial phloxes are very desirable, especially the scarlet and the white varieties, but they need water supply; and if you can get your windmill at work and water them well, you will have a magnificent show all through the late summer and autumn. They respond wonderfully to water. The old fashioned moss-pink (Phlox sublata) in its several varieties is a very useful spring flower. The achilleas are very hardy and useful. A. millefolium roseum is as hardy as our native yarrow and produces interesting pink flowers.

Achilea ptarmica var. The pearl is one of our most interesting white flowers and is perfectly hardy.

Anemones have rarely been planted in prairie gardens, but our native pasque flower, Anemone patens var. Nuttaliana, does well in cultivation. It is the first flower of spring over a large part of the state, and is always interesting.

Our wild columbine, Aquiligia Canadensis, does well in the garden if somewhat sheltered. It seems to be more at home in the crevices of a pile of stones.

Asclepias verticelliata, the whorled milkweed, is common on dry bluffs in western Minnesota. It is an interesting plant, and is cultivated and appreciated in Eastern gardens. It ought to be planted in our Minnesota gardens.

Many species and varieties of campanula are useful in the prairie flower gardens. They may be easily grown from seed, and need a little winter protection. They will flower the second year from the seed.

The perennial coreopsis does well in the prairie flower garden and when once established needs little attention other than to keep it free from weeds.

Several species of perennial larkspur do well on the prairies. A deep blue variety, whose specific name I cannot give, is particularly effective. I raised it from seed in the open ground. A little winter protection is beneficial to it.

Dianthus plumaries, the Scotch pink, is very hardy and very beautiful and ought to be in every prairie garden.

Dianthus barbatus, sweet william, may be grown from seed. The same is true of many other species and varieties of dianthus.

Galium boriale is cultivated in Eastern gardens, but the competition of the native product gives it rather a cheap appearance. When the native prairie flora has passed away the galiums will be better appreciated.

Geum triflorum grows wild on the driest bluffs in western Minnesota, and is very beautiful, especially when in fruit. It is cultivated in Eastern gardens and ought to be here.

The opuntias are native on the rocky ledges of the upper Minnesota Valley and thrive when removed to a dry garden.

The Iceland poppies are very hardy and beautiful and ought to be planted in every garden.

Pentstemon grandiflorus is native in western Minnesota, on river bluffs near the timber. Removed to the flower garden, it is very beautiful and effective. Pentstemon albidus grows on the driest bluffs of western Minnesota. It is an immigrant from farther west, and ought to succeed in our driest and most unfavorably located gardens. It produces large, light colored flowers early in June, and is very striking and effective. It ought to be introduced into cultivation.

In a remote corner of one's garden it is safe to introduce Saponaria officinalis, Bouncing Bets. It will grow luxuriantly and succeed.

Several species of sedum may also be introduced and will be quite effective. So far as I have tried them they are hardy.

We will not need to plant any silphiums or solidagos or sunflowers in western Minnesota for some time to come. Nature has done the planting for us with an unusually lavish hand. It is for us to look on and admire.

Statice latifolia is hardy at Montevideo and may be safely planted.

Tradescantia Virginica is common to all the prairie regions of the state. It is very beautiful and deserves a place in every garden.

We have raised hollyhock with good success at Montevideo. We like the sulpher-yellow double ones the best. They need some winter protection.

The tiger-lily will succeed anywhere without protection, and it is possibly by careful mulching to have a good showing of tulips.

But with the best management there are apt to be breaks in your perennial flower border. You will need annuals to fill these up. I would plant every spring seeds of escholtzias, asters, poppies, verbenas, pansies, balsams and morning-glories. In addition I would have a large bed of gladioli and a good supply of water.

A FARM FLOWER GARDEN.

MISS SARAH J. BUTTERMORE, LAKE CITY.

When spring comes a sunny spot is selected for a flower garden, sheltered from the north and northeast by trees so that the severe winds from these points cannot strike with full force on the flowers, as it is injurious to them; it is surrounded by a close fence to keep out the chickens. This should be done before the seeds are planted or even before the beds are moulded out; without a fence it is almost useless to raise flowers. Let the chickens get into a flower garden, and it is surprising to see how fast the seed will come up,—sometimes it will be up in an hour, sometimes more and sometimes less.

The garden having been made, then comes the moulding out of the flower beds. This can be commenced just as soon in spring as the ground is sufficiently thawed out to allow working. In regard to the planting of the seed, one kind of flowers are sufficient to plant in each row or bed as the best effect is produced in small beds by massing. Where plants are mixed, the tallest growing should be planted the farthest back as the beds are at the outside and the other plants graded down so as to have the dwarfest where they can have plenty sun and air. Geraniums make a very pretty and attractive bed in a flower garden, transplanting them from the pots in the house or greenhouse (but the latter is seldom found with farmers) to the garden as early in spring as danger of frost is over —into a square or round bed, planting the flowers four inches apart each way. The plants can be all of the same variety or mixed to suit the taste of the gardener; my choice would be the mixed. Pansies, dahlias, phlox, pinks and a number of others are also very beautiful plants and are perfectly hardy when once started, and, if properly cared for, will improve each year. The greatest trouble with annuals is that the seasons are too short.

I must not leave roses out,as a flower garden is not complete without them; they are some of the most beautiful flowers in cultivation, are easily grown and perfectly hardy. Roses have been very much improved the past few years. A few years ago we would have been glad to succeed in growing a few of the commonest roses in cultivation, now we can raise an abundance of the choicest roses there are. Dig out all your homely old rose bushes and go to the nursery and get new ones to fill their places, as you can get them there of every description and kind. Go to the nursery the latter part of June, it is then and there you can see a sight to behold—roses! roses!

I am a great lover of flowers and I think all of the ladies that are here are the same. I do not know how it is with the gentlemen; it may be that some of them like a thistle blossom better than a rose, so I will not have anything to say for them in regard to flowers. I will bring my essay to a close by saying to all of my floricultural farmer friends that are here tonight, especially to the ladies, as it is generally the ladies that are the flower gardeners, it you do not succeed in growing a nice flower garden the first or seeond years do not get discouraged, for, I think, we farmers here in Minnesota will with a little care and perseverance, in future years succeed in raising some of the finest flowers that can be grown in the North.

DECIDUOUS TREES AFFECTING MOISTURE AND TEMPERATURE.

J. P. ANDREWS, FARIBAULT.

We might mention, first, some reasons why we need more trees and shrubs. Just as it makes the air of a room more moist to have a wet blanket in it and saturate the carpets with water, so is the atmosphere made more moist by the evaporation from the leaves of the trees and the carpet of moist leaves under them. When heavy rains come, this natural mulching of leaves on the ground holds the water until the loose porous soil under the leaves has time to drink it all in, and it goes down five, ten, twenty or more feet, carrying plant food with it to the numberless rootlets that drink it in, whence it is returned as sap through the circulation of the trees, leaving the plant food for the development of wood, fruit and seed, while the water is evaporated through the leaves, making the atmosphere more moist and congenial to the health and growth of plant and animal life, again to be precipitated in the form of rain as before. But suppose that it falls on a hard, dry, baked field; in place of being absorbed by the earth, it runs down to the creek, into the river and ocean, and is lost to the section of country from which it started, excepting the small portion brought back by the winds. It is not only necessary for the best interests of agriculture that we have this more evenly moist atmosphere, but it is our duty to work industriously and intelligently for this end.

The forest-covered territory is like a great sponge, having for its breadth the area of the forest and for its depth from the tops of the trees down into the ground twenty to forty feet, or to the extent of the roots of the largest trees. No one can question that a sponge of these dimensions is capable of taking up an immense amount of water from the melting snows and spring rains, and giving it off in moisture during the heated period of our summers. It is not at all imaginative, it is only common sense.

We have had, during the past year, a sad demonstration of the extreme variation of temperature and moisture—a very nice winter, and delightful March weather, followed not only by April showers but by torrents of rain that washed our fields as they haven't been for years, if ever before.

In May when our orchards were in bloom and fruit setting, the temperature kept changing from cold to colder, till not only our fruit was mostly killed, but many trees were severely damaged, and some killed outright, being most disastrous to the trees that were fullest of bloom and fruit. Then followed a protracted drought that, in the language of the fast horseman would properly be classed as a "stayer," and "record beater." It staid with us from May till October, for its intensity and long duration beating all former records. This was very damaging in all parts of the country; in some parts, most notably on the broad Western prairies, where there was no forest growth to check the drying winds or pump up water to be evaporated and moisten the atmosphere, it was ruin.

Now if one-third of the area of those vast Western prairies was covered with trees, converting it into that big sponge, it would without

doubt give off sufficient moisture to the atmosphere so that crops grown on the remaining two-thirds would exceed the total amount now raised on the whole. And the expense of planting that one-third would not be so much as the damage incurred by a single year of failure. Thus this greater expense, or fine, if you please, is imposed upon us because we have devastated our forests and refuse to go to the lesser expense of replacing them.

The benefits to be derived from groves and windbreaks, either natural or artificial, around the farm buildings and in the pastures are incalculable. In these times we can ill afford to buy coal or wood or even burn old stumps to have the heat sent hurrying out of the house by the fierce blasts of a "norther" that shrieks outside like a multitude of demons trying to get in, and, in fact, *getting in*, not only at every crack of door and window but through the very walls of the house. Should it be necessary to do any outdoor work during one of these wind storms, we have to buckle on our shoes, button and belt on our great coats, tie down our caps, and as we step out, we involuntarily shrink back as the wind takes our breath away, for we forgot to tie that in. Go to the barnyard or even into the barn, and every animal you see stands humped up, looking as though life was a failure and they were thinking of trying death for relief.

It costs at least one-fourth more to care for stock under these conditions than when buildings and yards are properly protected by groves and windbreaks. Besides this there is the additional comforts to all the members of the family and to the stock, so that, that, in itself, should prompt every farmer in the northwest to have a good efficient windbreak around or, at least, on the west and north of his buildings and yards. It is the most effective and cheapest way he can move his farm to a much warmer climate.

Not to be classed as a calamity howler, it is a matter of congratulation that so many of our Minnesota farmers have these protecting groves upon their premises; and the best crops during the past year were in those portions of the state where belts of timber and groves are most plentiful—in fact, in some of the most favored localities we have had extra fine crops. A noticable feature is that most of the homes best protected by trees are where once was the broad open prairie, and experience taught their proprietors to get up a breastwork of trees.

But how often when traveling through what was once a wooded country we see buildings that were put up under the sheltering forest trees with their cooling shade in summer, now wholly unprotected, having the trees all cut away around the buildings, making it look so bleak, bare, desolate—anything but home. It seems these people who had a grand protection to begin with did not know how to appreciate it till it was gone, and with the one idea of clearing a farm so they could grow wheat, made the great mistake of commencing at their very doorway and enlarged the clearing as fast as possible.

NEW PROCESS FOR KEEPING FRUITF RESH.

DIVISION OF POMOLOGY, WASHINGTON, August 10, 1895.

The result of the experiments made in the latter part of the year 1894 and lately reported to the Horticultural Society of Soissons by Mr. A. Petit, chief of the laboratory of horticultural researches at the National Horticultural School of Versailles, deserves the attention and consideration all of fruit growers.

Impressed with the powerful action of alcoholic vapors on the mold which generally appears on the surface of fruits in a damp atmosphere, Mr. Petit noticed that pears and apples kept for several months in a surrounding saturated with vapors of water and alcohol, even were they at the beginning in a state of decay, showed no signs of mold, while fruits in every particular identically similar to the former, stored under the same conditions but not exposed to the action of alcoholic vapors, were entirely covered with it.

Taking advantage of this observation, Mr. Petit applied the principle to the preservation of fruits in general, and most particularly to grapes, because, more than others, the latter are subject to mold. It was to be foreseen that grapes kept, from the day they are cut off the vines, in an atmosphere saturated with vapors of water and alcohol would, by the retarding of the sweating period, not only remain free from mold, but would even retain their natural aspect. Consequently, should the temperature be constant and low, the preservation could be maintained long and well.

On the 31st of October, 1894—that is, very late in the season and at a very unfavorable time—Mr. Petit placed, with other fruits and a bottle filled with 100 cubic centimeters (61 cubic inches) of alcohol at 96°, some bunches of grapes known as "Chasselas de Fontainebleau," fresh from the vine, in a brick recipient in the form of a parallelopiped, cemented inside and closed as hermetically as possible by a common wooden door. In two similar recipients contiguous to the first, one of which was kept open and the other closed, but without alcohol, were stored similar fruits from the same trees and vines. The fruit were laid on wood shavings. The recipients were built in a very damp celler, the temperature of which varied regularly from 10° to 8° C. (50° to 46½° F.) during the whole time the experiment lasted.

On November 20, the grapes placed in the recipient left open, and especially so those in the closed recipient without alcohol, were mostly rotten and covered with mold and were immediately removed. In the recipient containing the bottle of alcohol, the grapes were beautiful; on one bunch, two grapes had turned brown, but were firm, full, and free of mold; they did not taste at all sour, thus differing essentially from moldy grapes, especially those subject to *Penicillium glaucum*. The hair hygrometer in the recipient registered 98°. On December 7, the bunches of grapes in the recipient containing the alcohol had kept their fine aspect; on most of them, however, one or two grapes had turned brown and were in the same condition as those above referred to. On December 24, same results; on most of the bunches could be seen one or two grapes commencing to decay. At the end of nearly two months, each bunch had

lost but from two to four grapes each and all were in a perfect state of preservation, the stalks being perfectly green and the grapes firm, full, and savory, and having all the qualities of fresh-cut grapes.

At the conclusion of the experiment, 28 cubic centimenters (17 cubic inches) of alcohol at 60° remained in the bottle out of the 100 cubic centimeters (61 cubic inches) at 96°, but, as Mr. Petit remarks the door of his recipient had not been built with great care and did not close hermetically, hence a useless consumption of alcohol.

This process offers many advantages. It is simple, easy of application, and cheap, and, if adopted by our fruit growers, would allow them not only to hold their fine fruit until they can dispose of them at a fair price, but would also insure them handsome profits during the winter months.

FRUIT WITHOUT SEEDS.

Selected.

Appendicitis may not be so fashionable a disease a few years hence as it is now. Gardeners are trying their best to get rid of seeds in fruits. Already we have the navel orange, which is nearly always seedless. Some varieties of apples have been produced that have almost no seeds. They are abnormities. Sometimes they are called "bloomless," because the blossoms have no petals and in some cases lack stamens. The core is very small, and commonly there is a hollow at the end opposite the stem. These seedless apples are generally poor in flavor, being grown merely as curiosities.

Raisin producers in California are trying to obtain seedless grapes for raisins. The object in view is to get size and seedlessness in the same fruit. You are familiar with the seedless grapes of Corinth, which are commonly known as "currants." The Sultana raisins of southeastern Europe are likewise seedless grapes. Both of these varieties are now cultivated in California, but they are small. A prominent grower in Fresno county is working in this direction with the Muscat of Alexandria, which is a leading raisin grape in California. He selects cuttings from those vines which produce less than the normal number of seeds. Continuing this process from year to year, he hopes to reduce the grapes to absolute seedlessness eventually. It is believed that the seedlessness of the Corinth and Sultana grapes was obtained by similar means.

The banana is seedless, and has been so for centuries, though nobody knows why. It is propagated by suckers, and possibly it had no seeds when it was first found in the wild state. The banana is a modified berry. Cutting the fruit down through the middle, you will sometimes see a few little brown spots, which are rudimentary seeds. Occasionally the banana does actually produce seeds. The pineapple is nearly seedless, being propagated likewise from suckers and from slips. The egg-plant, which is a fruit botanically speaking, is occasionally seedless. This plant is able to produce developed fruit, whether the blossoms are fertilized or not.

Horticulturists are endeavoring at the same time to rid fruit plants of thorns. Some oranges and lemons are very thorny—for example, the high-priced King orange, which is the best of the mandarins. It is rarely seen in this market. The first trees were brought to the United States from Cochin China. In Florida its thorniness has been diminished by selecting buds from branches with the fewest thorns. Thorns are objectionable because they puncture the oranges and lemons when the branches are blown about by the wind.

Efforts are being made to get rid of the thorns on raspberry and blackberry plants, simply for convenience in picking the fruit. The thorns are intended by nature to protect the plants from animals. Cultivators select those plants which by chance happen to be thornless or comparatively so.

GROWING EVERGREENS FROM SEED.

CHARLES. F. GARDNER, OSAGE, IOWA.

Good seed must be procured of the previous season's crop, avoiding seed that is old. Make examination and see that the germs are plump and sound. The seeds of the pines, spruces and firs can be tested in the winter in the same way you would test wheat, oats or barley to find the number of grains that will freely germinate in a given number of seeds. Seeds of the evergreens mentioned should be kept in a cool, dry room until the time to plant arrives. Soak in warm water from twenty-four to thirty-six hours before planting. Seeds of the arbor vitæ should be stratified as soon as picked from the tree, as drying destroys their vitality; red cedar and all juniper seed should be stratified as soon as gathered, and remain in the stratified state one year before planting.

The ground selected to plant evergreen seed should be first-class soil for corn, as free as possible from weeds or grass. The best way to secure this condition is to sow a crop of potatoes, with such culture as will absolutely destroy everything of the weed kind. Plow and pulverize well in early autumn, then, in about a week afterwards, throw the ground up in rough beds running east and west. This is done with horses and plow in such manner that the beds when finished will be four feet wide and from four to six inches above the general level. The alleys between the beds should be two feet in width.

Set good strong posts eight feet apart each way over the entire ground to be planted. Set them from two and one-half to three feet in the ground and seven feet high from the ground up. Brace the outside row of posts all around. Then run heavy galvanized wire on the top of each row of posts, north and south, and east and west; fasten securely with a staple on top of each post where the wires cross. Cover the whole top with common wire lath fencing, made with one twist of wire less than common between the lath to bring them close together. Enclose the sides in the same way, fastening everything securely with staples to the posts. Instead of

using lath, brush can be used by placing the wires two feet apart and weaving and tying brush to them. The shade must be evenly distributed so that half or little more than half of the rays of the sun will be intercepted. After finishing your shading, go over all your beds with a cultivator, and then let it alone until spring comes, and the ground is dry enough to work well. Scatter a liberal dressing of wood ashes over all the beds, then pulverize thoroughly to the depth of four inches and finish making the beds, having the edges straight, beds four feet wide and an inch or so higher in the middle than at the edges. The soil must be completely pulverized and absolutely free from rubbish of every kind

You are now ready to sow the seed. Sow broadcast and have three or four seeds to the square inch. After sowing a bed, run a common garden roller over it until every seed is pressed firmly into the soil. Cover the whole bed with light colored, fine clean sand to the depth of one quarter of an inch for the spruces, Scotch pines and firs, and about one-half inch for seeds like the white pine. Red cedar and arbor vitæ seed are taken from the place where they are stratified and sown, sand and all, then they are rolled and covered as the others, with the exception that the arbor vitae seed is just barely covered with sand, and pulverized dry moss is sifted over them to a depth of a little less than one quarter of an inch, and the bed carefully sprinkled with water through a fine hose.

After every rain the beds must be looked after and sand applied again wherever it has washed off. The seed germinates in from ten to twenty days after planting. All weeds must be pulled out by hand as fast as they appear, as the beds must be kept perfectly clean. The object in having the sides enclosed as well as the top is to keep out rabbits, dogs, poultry and other vermin. A dog or rabbit merely walking over a bed when the trees are coming up will destroy thousands. A good boy with a shot gun is a necessary adjunct to keep certain birds from digging up and eating up the seeds and trees; this must be attended to. While the little trees are coming up, if the the weather is dry, the bed must be carefully sprinkled every evening. Use just enough water to thoroughly dampen the sand on the beds. Have some dry sand stored away so that during long spells of rainy, damp, foggy weather you can get it and sprinkle the beds with it after each shower. This coating of dry sand should be very thin, not over 1-32 of an inch deep. Pull out the weeds before they form the second set of leaves. Keep the alleys clean with the use of the hoe.

The ground occupied by the seed beds should be at least six or eight rods from any buildings, trees, hedges or other windbreaks. A windbreak is a good thing to have around your seed beds, if at a proper distance. I prefer a distance of about twenty rods or more to secure good air drainage. The beds must be constantly watched until the little plants have formed their true leaves. The most important objects to keep in mind are: first, the birds must be kept off; second, the weeds and grass must be pulled; third, if the weather is too dry, sprinkle, if too damp, use the dry sand.

After the true leaves have formed, the plants require little attention except that weeding must be kept up. When the ground be-

gins to freeze in the fall cover all the beds with wild hay, using just enough to cover them and no more. This is removed the latter part of the following April, and the trees will require no attention during the summer except to be kept clean from weeds. The next fall treat the beds to another covering of hay and the following spring you will have, if you have closely followed my directions, in spite of possibly some severe losses, 2,000 or more trees on each four feet length of bed, two years old and from three to ten inches in height, ready to be transplanted.

MONTHLY REPORT ON NOMENCLATURE AND SEEDLINGS.

J. S. HARRIS.

August 27th, Received from L. J. Gjemse, Hader, Minnesota, three varieties of native plums. No. 1. Medium large (1 3-16 inch diameter); form round; color deep red; skin thick but without acridity; flesh orange and apricot-yellow and fair consistency, sweet and excellent flavor; stone medium size, round and thick; nearly a cling; season, September first.

No. 2. Size medium to large (1⅛ inch diameter); color dark crimson-red and skin very thickly covered with minute yellow dots; form round; flesh yellow, juicy, sweet; stone medium round thick and very smooth; season, September first.

No. 3. Medium (1 1-16 inch diameter); form round; color yellow, marbled with red; flesh yellow, with juicy flavor and very good; stone medium round and thick; a cling. We should judge that all three varieties would cook well, and would fill an important place between the Cheney and the Desota.

August 27th. Received from Theodore Williams, Benson, Neb., plums marked—

Brittle Wood No. 1. Size very large (diameter, 1⅝ inches); form smooth and round; color yellow ground, mostly covered with deep red and very thickly set with irregular grey dots; suture, a plain deep crimson mark without any depression; skin thick; flesh orange-yellow and of good consistency; flavor number one; season, about Sept. first; stone medium, round and thick; a cling. It keeps well and will be a good plum for market,

Sept. 3d. From N. E. Durand. A Russian apple, name of which proves to be Antonovka.

In quality the Antonovka is one of the best of the Russian apples. Size medium to large; form roundish or oval, somewhat flattened at the ends; color, straw or light yellow, with enough fine grayish dots to give the skin a little rough appearance; stem short, in a deep, ridged, dark-russeted cavity; calyx closed in a medium deep ridged basin; flesh nearly yellow; fine flavor, pleasant and good; core medium; season, September and October. This tree is a symmetrical, upright grower, among the most vigorous of the Russians, and with us as hardy as the Oldenburg.

WISCONSIN STATE HORTICULTURAL SOCIETY—WINTER MEETING, 1895.

M. PEARCE, DELEGATE.

The horticultural and agricultural societies met at the same time in different rooms of the capitol; also the legislature was in session and a large gathering of representative men of the state. On the whole it was a grand gathering from all parts of the state; a more gentlemanly and intelligent class I never met. Wisconsin was admitted into the union in 1848, ten years before Minnesota. The old pioneers of Wisconsin are nearly all gone, but not forgotten; their sound judgment and good works are manifested by their public buildings and far-reaching institutions, which have brought Wisconsin to the front.

Irrigation and spraying were two prominent subjects. It was conceded that windmills were failures for large plantations, unless reservoirs that would hold large quantities of water as a reserve in time of need, could be made on high ground.

Good success was unanimously reported from the direct flow of artesian wells on strawberry and other fruit plantations. Irrigation in Wisconsin, like Minnesota, is in its infancy, but will not so remain. The fruit growers of Wisconsin have too much at stake to allow their large fruit plantations to be destroyed by drought, and great efforts are being put forth to overcome the drought in some practical way.

The spraying of fruit trees and other fruiting plants was ably discussed. They were not all of one mind on the subject. Some got good results from spraying, others thought it did no good. It was suggested that if spraying could be made universal to destroy the codling moth, tent caterpillar and other destructive insects much good would be derived from it. A state law on the subject was thought to be necessary.

The strawberry, blackberry and raspberry are extensively grown in Wisconsin; twenty, forty, eighty and one hundred acre plantations of those fruits are not unusual. The growers have organized shipping associations and send their fruit in refrigerator cars to all parts of the South and North in perfect condition.

The growing of the apple in Wisconsin does not receive as much attention as the small fruit, although they have many fine large commercial orchards which yield good crops of fruit. The indications are that Wisconsin is going to give more attention to the growing of apples than she has of recent years. All new seedling apples of value are diligently looked after and being tested at the central station.

Wisconsin has many live local horticultural societies, which are doing much good in the state, and send each year one or more delegates to the state meeting. In this way the most that attend the annual meeting are practical horticulturists, which is of great importance to a state horticultural society and relieves a few members from doing all the talking.

Testing new strawberries and originating others is done very extensively by some growers at much labor and expense. Of the

new kinds now at the front are Timbrell, Greenville, Splendid, Enhance and others. They grow the same kinds of raspberries as are grown in Minnesota with a few additions of new kinds, as the Columbia and Loudon.

The Ancient Briton and Badger State blackberries are the principal ones grown. The latter has been sold largely in Minnesota for the Ancient Briton. It is a Wisconsin seedling, resembles very much the Snider, but said to be much better.

Minnesota hybrids and crabs are not grown largely in Wisconsin. The Wealthy is the only apple of note from Minnesota grown in Wisconsin, except at the north. The McMahon and what is known in Minnesota as Giant Swaar are both popular in Wisconsin, and many of the old varieties which Minnesota discarded after the hard winter of 1872 and 1873. Grapes are not as much grown for commercial purposes as they are in Minnesota.

The papers read at the meeting were all very good, though some of them were too long for the occasion. Those of the ladies were extra good, as they usually are. They had a good program. The whole time was spent with much pleasure and profit. The fruit growers of northern Wisconsin think it unjust not to allow them to exhibit their fruit at our state fairs for premiums. It is a matter that a committee should be appointed and report upon at our next meeting.

PLANT LICE AND CABBAGE WORMS.—The lice found on cabbage and cucumbers, and the worms on cabbage, may be destroyed by spraying with kerosene emulsion, taking pains to reach the colonies of lice, especially on the underside of the leaves, where they are likely to congregate. To do this it is necessary to have a nozzle arranged so as to throw the spray upward to the underside of the leaves, or in the case of cucumber vines it may be more convenient to turn the vines carefully over while the spray is being applied. The cabbage worms will also be killed by the kerosene emulsion, if wet with the solution, but, when on the inner leaves or burrowing in the heads of cabbage, it is difficult to reach them with any direct application. London purple in a solution of 1 lb. to 200 gallons of water can be used until the cabbages are well headed out, and even then, if applied around the lower leaves on which the worms are numerous, there will be no danger of poison.

The manner in which the great forest fire limits its ravages is not a little curious. According to the prevailing theory, the air over a burning area, rarified by the intense heat, is pushed upward by the colder and heavier air of the surrounding area. This indraught of cold air, rushing in from all sides and becoming more and more powerful, at length drives the flames back upon the center of th burnt district, where the conflagration ends from lack of fuel.—*Baltimore Sun.*

BIRDS AND THEIR RELATON TO HORTICULTURE.

WM. T. SHAW, ST. ANTHONY PARK, MINN.

There, probably, is no rural occupation affected by birds to the same extent as horticulture. Not only are birds conspicuous in the spring or summer for the good or harm which they do, but also in fall and winter. In studying birds in this connection, we find some very interesting facts.

It is a common belief that those birds which live upon insects are beneficial. Now,is there not room for a serious mistake here? When we consider the fact that many of our insects thus destroyed are exceedingly useful to horticulture in many ways, we see that a great deal of harm may be done by insectivorous birds eating such insects. Hence we see that in order to make a clear judgment of the relation which birds bear to us, we should study them from an entomological as well as a botanical standpoint. When studied in this way some surprising facts are revealed.

Once, the appearance of a hawk or an owl was a signal to the farmer to seek some means of destroying it. Now, as has been shown by careful dissections of very large numbers of crops and stomachs, there are only a few species among these predacious birds which are positively injurious, while by far the majority are of great value in killing rodents and noxious insects. The owls are deserving of special protection because they remain with us during the entire year, and also because they capture their food chiefly in the dusk of evening and in early dawn when many of the injurious rodents such as mice and hares are running about. The most injurious insects also fly about at this time.

In studying some of the other families of birds we obtain various results. Woodpeckers, once thought to be so valuable to horticulture, are now found to be quite indifferent—some are even injurious, as the yellow-bellied woodpecker, or sap-sucker; so well known by the peculiar manner it has of pecking holes in the bark of the trunk or limbs of trees. Quite frequently a perfectly healthy tree is selected and the bark is so punctured in order to make traps into which insects may collect to feed upon the sap that the growth of the tree is greatly retarded, and in many cases permanent injury is received. The work of destroying borers is carried on extensively by these birds, but their aid comes too late, as the damage is done before the insect can be reached by them.

The English sparrow has received special attention and very careful study and has been proved to be an enemy to horticulture. Not only has it been found guilty of doing damage by directly eating fruit of various kind, but also in destroying buds in large quantities.

Again, we have birds of a very useful nature. The yellow-billed cuckoo deserves special notice, as it destroys hairy caterpillars in large quantities. So also is the rose-breasted grossbeak useful, as it destroys potato beetles. Even this bird is forced to change its food habits, as it was frequently observed during the past season, feeding upon green garden peas. Doubtless, this was owing to severe drouth and scarcity of other food.

There is still another class of birds, examples of which are the thrushes and blackbirds, which have the good they do in the spring counterbalanced by the harm they do the crops. Much damage may be prevented by having some early and poor variety of fruit planted as a hedgerow.

In conclusion, the writer wishes to call special attention to the importance of protecting the birds of prey. Other birds, as well, deserve our protection and should only be killed when they threaten to destroy our crops.

THE ORCHARD.

E. H. S. DARTT, OWATONNA.

Mr. President and gentlemen: The best location for the orchard is found to be a high northern slope tipping down to the north or northeast, the more the better, provided it is not so steep as to interfere with cultivation. Why is this best? Because our trees are killed by drouth and on this slope the hot sun and drying winds do not absorb moisture as rapidly as on level land or a southern slope.

THE WORST LOCATION

is a low sheltered nook where the cooling breeze is excluded and the sun has free access. Why? Because it is the hottest place in the daytime and the coldest place at night, consequently, the greatest and most sudden changes occur.

Many farmers surround their buildings and orchard with a dense windbreak on all sides, and they wonder why the orchard does not thrive. Except so far as the ground is partially shaded, this is a hard spot for fruit trees, and the good of the orchard requires the removal of the windbreak on the north and the trimming up or thinning out in other directions,so as to secure a rather free circulation of air, the windbreak being only useful to the orchard by partially shading the ground and preventing fruit from being blown off.

THE BEST TREATMENT

seems to be cultivation, shallow, near trees, and mulching with manure at the rate of thirty loads to the acre, each and every fall or early winter. Cultivation protects against drouth;mulching prevents rootkilling, and manure keeps up vitality. The bearing orchard that is not well manured will soon starve to death.

The Transcendent and some other crabs subjected to this treatment might blight to death.

Prune early and lightly in such a way as to secure a low top with center stem and moderately sized side branches.

If trees like the Wealthy kill down, allow the sprouts to grow up from the ground without pruning,and they will soon make bearing trees. But we must be on the lookout that such trees are not eaten by rabbits or crushed by settling snowdrift.

WHAT SHALL WE PLANT?

After our experiment sations have had a little more time they will be good authority; but for the present read the reports of our State

Horticultural Society or apply to any orchardist in your own locality. If you find an honest nurseryman (there are many such) take his advice. It will be safest never to take the word of a canvasser, whether he sells trees or anything else.

WHERE SHALL WE BUY?

Buy of the nearest nurseryman who has the reputation of being honest.

The far-fetched and dear bought theory is the biggest humbug in the world when applied to trees.

Beware of the man who sells wonderful new things at extravagant prices unless you have plenty of money and love to be sold!

WHAT ABOUT THE PROFITS?

Bad location, worthless varieties and bad management have spoiled the profits of the orchard in this part of the state, but I will say for your encouragement that my best acre of Duchess has yielded a net profit over all expenses of not less than $400. And there seems to be no reason why any of you with the light now before you, a fair location and sufficient ability to run a farm successfully should not make the orchard a source of profit fully equal to that of any other branch of farming.

BUFFALO-BERRY.—The buffalo-berry that grows here is an all-winter fruit; the berry is sound and hard. I think there will be a great many of them planted after farmers find out what they are, as they serve three purposes—hedge, windbreak and fruit. I know of no fruit that will make jelly equal to this berry. I understand there will be a good many of the trees planted in Minnesota, Iowa, and the Dakotas next spring, and, if so, by 1895 they will prove for themselves, as they bear fruit the first season if planted early in the spring.—*Farm, Stock and Home.*

RESULTS OF SPRAYING.—Mr. B. F. Galloway, of the U. S. Department of Agriculture, made a very decisive experiment with fungicides on the grape. A vineyard which had been abandoned for five years on account of black rot was taken, pruned and cleaned up and divided into five plats, four of which were sprayed and one not. The plats treated gave from 93 to 99 per cent. of perfect bunches, while the plat not treated gave none. The Bordeaux Mixture gave the best results, but the carbonate of copper was nearly as good, and was easier to prepare and use and cheaper.

We stir up the soil often in the summer that we may retard the evaporation of moisture, but the amount of moisture checked in this way is small compared with that which is taken from the soil by an ordinary growth of weeds. Therefore, the killing of the weeds by the plow is of vastly more importance in conserving moisture than is the mere stirring of the soil.

October Calendar.

J. S. HARRIS.

Orchard and Nursery.

Now that the apples are all gathered, weeds, grass and every kind of rubbish that can harbor insects and vermin should be removed from about the trees and burned.

If swine can be fed in the orchard a few days after the fruit is gathered, they will destroy the larvæ of injurious insects, and much less fruit will be damaged by them—also weeds and grass are destroyed, and the soil enriched. Plowing and manuring may be done as soon as all danger of stimulating new growth is past.

Whitewashing the trees (a pound of copperas being dissolved in each bucketful of the wash) or a wash of strong soap suds destroys bacteria and many insects and puts the trees in a good condition for winter.

Mulching for winter protection should not be done until next month or until the soil is well cooled off.

Nursery trees for next spring's planting or sales should be dug this month, as early as the leaves have accomplished their season's work, and part easily from the branches. Store them for the winter in a cool cellar, with sufficient moss or soil about the roots to prevent drying out, or bury in a dry bank outside.

Trees to be carried over in the nursery are better for plowing between the rows just before the ground freezes, throwing a furrow towards each side of the rows.

Those who purchase their trees had better do so this fall, that they may be on hand for early spring planting.

The making and planting of currant cuttings should not be longer delayed. Plant them out in a rich, mellow soil, in rows three feet apart and six inches apart in the rows, with the top bud just above the surface; later on, mulch with leaves or litter.

Red raspberries and blackberries may be planted this month, provided they can be given some protection through the winter—a shovelful of earth or peckful of litter is usually sufficient, Clear the dead canes and all rubbish out of the older plantation, and have everything in readiness for laying down and covering just before winter sets in.

Vegetables.

In the vegetable garden, gather beets, carrots and onions before they are injured by the frost. Cauliflower, cabbage and celery should remain as long as possible without danger of hard freezing.

Beets keep well stored in pits, onions keep best stored in a dry cool room, and potatoes in a cool, dark cellar that is frost proof.

After the crops are gathered, the vegetable garden should be

cleaned up, manured and plowed, and, if the soil is inclined to clay, leave the surface rough.

Flowers.

In the flower garden, everything that is tender should be taken up and put into winter quarters before it is frozen.

Rake off the lawn and remove everything that is unsightly. Be prepared to dig in fertilizers around hardy herbaceous plants, and to cover such as need protection.

ZANZIBAR WATER LILIES—We derived great pleasure from our water lilies last year. Our tank is six feet across and eight inches deep, and in this we place six inches of rich soil—an old hotbed bottom would furnish the right thing. In the tank we put six plants in the first week in June, and in about two weeks the first flowers were open, and the plants continued blooming until the first frost in winter. There were from six to ten flowers open every day; the flowers opened in the morning and closed in the evening. We had one plant in a wooden pail and it bloomed, but the flower was small; one of those in the tank measured eight inches across, while that in the pail was only three inches. In some respects the flower is not equal to our Nymphaea odorata, but the easy manner of growing them places them a long way ahead of our natives. You have only to put the seed in a bowl or open dish in which is placed a couple of inches of soil, and keep it covered with water at a temperature of 70° or 80°, and in about two weeks they will have started to grow. At first the growth is slow and the leaves were only about two inches across when I planted ours out in June.—*Canadian Horticulturist.*

CULTIVATION VS. IRRIGATION.—J. C. V.—Some farmers claim that thorough cultivation, and two or three irrigations during the season is better than more irrigation. (1) Is this true of potatoes? (2) Of what kind of fruit is it true? (3) State approximate number of times for cultivation, and likewise for irrigation in each case. (4) How late should deciduous fruits be irrigated? and (5) how early in spring.

(1) No, it is not; potatoes, as a rule, should be irrigated at least once a week until their maturity, then no more. (2) Of no kinds. All fruits require irrigation, especially during the hottest part of the summer. (3) Cultivation ought to follow each irrigation as soon as the ground is in a fit condition. Cultivation should be once or twice a week. (4) Deciduous fruits should be irrigated until they are well matured, and just before and during the ripening season; if the weather is hot they require more thorough irrigation. Any intelligent farmer will soon learn when to irrigate, and how long to keep it up each time. Every farmer knows about when he would like to see it rain. Instead of watching the clouds and praying for it to rain, if he is prepared to irrigate he can answer his own prayer. —N. G. BLALOCK, M. D., Washington.

Secretary's Corner.

APPRECIATED.—It is always pleasant to know that our work is well received and so we are glad to note these cheering words from the "Utah Church and Farm" published in Salt Lake City, Utah: "We appreciate your paper here very much."

PICTURES OF STATE FAIR.—It was the intention to publish some engravings of the state fair in connection with the description in this number; but a delay in getting them necessarily postpones them till November.

APPLE SEEDLINGS IN AITKEN COUNTY.—Prof. Green is just back from a short trip in Aitken county to look up some promising seedlings. That is a good way north for the apple, but he speaks of a number of varieties of the Russians looking well there.

SECRETARY'S OFFICE HOURS.—It has been found convenient, on account of the pressure of other duties, to change the hours at the secretary's office from 9 to 12 in the forenoon, as heretofore, to 1 to 4 in the afternoon. The office days—Tuesday, Thursday and Saturday—remain the same, but friends calling will likely find the secretary in almost any afternoon.

FRUIT FOR THE WINTER MEETING.—Quite a quantity of fruit has been placed in cold storage for this purpose and a good deal more is stored in the cellars of the members at home, and we may expect a greater show than we have ever had before at a winter meeting. Be sure and save any good specimens you have and bring or send them.

PROF. E. S. GOFF, MADISON.—It was a pleasure to meet at our state fair, Prof. Goff, horticulturist at the experiment station, Madison, Wis. His sunbrowned face indicated the practical character of the work he is doing. Evidently he is found much in the fields. Our members have probably noticed the article on irrigation in the last number by Prof. Goff. He is doing further work in that line of which we may hope to hear soon.

SOIL FROM THE ORCHARDS.—It has been suggested by Mr. Wyman Elliot that it would add much to the interest of the discussion of the orchard question next winter if members would bring with them samples of the soil and subsoil of the ground on which their apple trees are growing, arranged, if possible, as to order and depth as found there. This is especially desirable from the orchards that the society committee, Prof. Green and Mr. Wedge, visited lately, and upon which special reports will be made. Will members please note this and as far as possible arrange to bring such specimens to the winter meeting?

1. E. P. Watson. 3. Pres. Ed Weaver. 5. Clarke Chambers. 7. J. H. Letson.
2. Vice-Pres. Wyman Elliot. 4. Sec'y E. W. Randall. 6. W. M. Liggett. 8. C. N. Cosgrove.

Board of Directors Minnesota State Agricultural Society, from photograph taken in Horticultural Hall, State Fair Grounds, September, 1895. Two members of the Board, J. J. Furlong and Vice-Pres. D. R. McGinnis, were not present.

THE MINNESOTA
HORTICULTURIST.

VOL. 23 NOVEMBER, 1895. NO. 10

THE CONSERVATION OF SOIL MOISTURE BY MEANS OF SUBSOIL PLOWING.

T. L. LYON, B. S. A.

From Bulletin No. 43 of the Agricultural Experiment Station, Lincoln, Neb.

(The fact shown in this valuable article is clearly of the greatest importance, and fruit growers would do wisely to heed it. Sec'y.)

The question of water supply for crops has been met and successfully dealt with, both in the case of a surplus and in many cases where a deficiency of moisture existed. By drainage on one hand and irrigation on the other, it has been possible where the natural conditions were favorable to withdraw from or apply water to the soil according to the needs of the case. Unfortunately, however, irrigation is not always practicable. Most of the land in Nebraska would be benefited by a larger application of water to the soil than is offered it by nature, although a comparatively small area of the state does not receive an annual rainfall large enough to raise a crop. As the surface water supply is very limited, and as that is at present the only supply practicable for irrigation, it is very apparent that we must properly conserve the water obtained by precipitation.

The ordinary methods of soil preparation and cultivation have, during the past two years, proved inadequate to bring the soil into a condition capable of retaining, through a prolonged dry spell, the moisture it received by precipitation. Experiments have shown that subsoil plowing,* especially if done in the fall, and a thorough cultivation of the land during the growing season will do much towards conserving the soil moisture, thus enabling the crops grown thereon to withstand a drought much better than those grown on land treated in the ordinary way.

The good results of subsoiling on the Experiment Station farm have been very marked. No experiment was planned for testing the effect of subsoil plowing, but on land that had previously been subsoiled for sugar beets and this year planted to corn, the effect of subsoiling was so strongly marked as to attract the attention of all who saw it. The subsoiled and surface plowed portions of land on which the corn is growing are in the same field on the east side of the farm. It is upland soil, with a gradual slope towards the east. In composition it is a fine loam with considerable organic matter. In the fall of 1891 a portion of this field was subsoil plowed

*Loosening the subsoil without bringing it to the surface.

for sugar beets, and this crop was raised the following year. It was not again subsoiled but plowed in the same manner as was the remainder of the field. It is a very noteworthy fact that the position of this subsoiled land can now be determined almost to a row by the superiority of the corn growing on it. The stalks on the land not subsoiled are small, badly dried up and have not made any grain, while those on the subsoiled land are of good size, having a fresh, green appearance, and will give a fair yield of grain. This, it must be remembered, is *the effect in 1895 of subsoil plowing in the fall of 1891.*

Such results are encouraging in the extreme. They show that with very little extra expense crops can be raised with much less rainfall than is generally supposed. The subsoil plowing can be done with three horses, and does not require much more time than surface plowing. The subsoiler should follow in the furrow of the surface plow. The operation doubles the expense of plowing, but, as has been shown, its beneficial effects continue for several years. Probably, once in three years would be often enough to subsoil, but that has not yet been determined definitely.

In all cases in which subsoiling has been done in the fall that have been reported to this station, the results have been highly satisfactory. If the effect has not always been apparent the first season after subsoiling, it at least makes itself felt in the course of two or three years. The reason for this is that if very little rain falls after the subsoiling and before the crop or crops on the land are grown, as has been the case in the last three years, the small amount of moisture that is received sinks more readily than otherwise into the soil and, though retained there, is not easily given up to the plant roots until the demands of the soil itself are satisfied. After the practice has once been started, however, the excess of water beyond the demands of the soil always continues.

Among those who have tried subsoiling in this state are Messrs. Youngers & Co., of Geneva, who deserve great credit for the enterprise they have shown in their experiments on this subject and

their public spirit in giving others the advantage of their experience at considerable expense to themselves. The following is their own description of their experience with subsoiling:

"A field that was subsoiled in the fall of 1891 and cropped to corn the seasons of '92 and '93 was planted to oats in the spring of '94 and produced a yield of 39¼ bushels per acre, while on another portion of the same field which had been subsoiled in the fall of '92 and raised a crop of corn the season of '93 the yield of oats was 44⅓ bushels per acre, showing a difference of 5 bushels per acre in favor of the land which had raised but one crop since subsoiling.

"Now we will compare the results on land on the same farm not subsoiled. Land subsoil plowed in the fall of 1892 and planted to corn in the spring of 1893 yielded 75 bushels per acre, while corn on land not subsoiled, but otherwise treated in *identically the same manner*, yielded but 36 bushels per acre. Land subsoiled and planted to potatoes in the spring of 1893 yielded 125 bushels per acre, while the potato crop on land not subsoiled was practically a failure. This season (1894) the yield of potatoes on subsoiled land was 96 bushels per acre. The potatoes were planted on the 18th of May, and on June 23d we had the last heavy rain of the season. From June 23d to August 16th we had 0.49 inch of rainfall, less than ½ inch in fifty-four days, and still we raised a fair crop of potatoes. Rye on subsoiled land yielded 30⅓ bushels per acre; on land not subsoiled, 2½ bushels. Oats sown on land which had raised one crop of corn since subsoiling yielded 44⅓ bushels per acre; on land which had raised two crops of corn since subsoiling, 39¼ bushels per acre; on land NOT SUBSOILED, 17 bushels per acre."

This was a carefully conducted and thoroughly reliable test, and one that any farmer can make for himself.

It is easy to understand why subsoiling is peculiarly well adapted to the agriculture of Nebraska when the conditions influencing the growth of crops are examined. In the first place,there is,throughout most of the state,an annual rainfall somewhat less than that of most arable portions of the country. Added to this is a very dry atmosphere and periods of extreme heat accompanied by hot winds,which makes the rate of evaporation very high. From the readings of the wet bulb thermometer, it is calculated that the annual evaporation from a water surface is 40 inches in the eastern part of the state and 50 inches in the western part. This is about twice as much as the annual rainfall in the eastern portion and considerably more than in the western portion. Such conditions make it necessary to remove as far as possible the opportunity for evaporation of the moisture from the soil. In order that the evaporation shall be reduced to a minimum, it is imperative that the water should soak deeply and quickly into the soil; but to do this the soil and subsoil must be loose. Hellriegel showed very clearly by experiment the difference in the water holding power between a loose and a firmly compacted soil. He took a quantity of loamy soil, and, after dividing it in two parts, firmly compressed the one, while the other remained loose. He then determined the water holding power of each, and found that of the compact soil to be only 26 per cent., while that of the loose soil was 40 per cent.

Now, most farmers in the state who have tried subsoil plowing know that the subsoil is not loose. Although the surface may be so loose as to blow badly, yet it is remarkable how firmly compacted the subsoil is at a depth of sixteen inches.

A mechanical soil analysis of the Experiment Station farm soil lends much aid in explaining the beneficial results obtained from subsoiling the land from which the sample was taken. * * *

It will be noticed that there is very little sand in this soil, and a very large amount of silt. These silt particles are nearly as fine as clay, and it is well known that soils composed largely of silt pack very firmly, as does clay. In fact, these two kinds of soil resemble each other quite closely, inasmuch as they are both generally well supplied with the elements of plant food, but both difficult to work if plowed when wet. This firmly packed condition of the subsoil has acted in two ways to deter the growth of the crops grown thereon. It has prevented the rain water from soaking in quickly, so that water deposited by summer rains was largely vaporized before it permeated the subsoil, and its poor absorbing power prevented its holding large quantities of water even when these were supplied. The fact that in this region large quantities of water fall in a very short time, makes it imperative that not only the surface soil but also the subsoil be in a condition to absorb it quickly and freely, for, if the surface alone be used as a reservoir, it is soon exhausted by reason of the rapid rate of evaporation. It has also served by excluding air and moisture to prevent the decomposition and nitrification which render the fertilizing materials in the soil available for the use of the growing plants. Thus, the plants have only received nourishment from the surface soil, while had the subsoil been loosened they would have had a much larger store to draw from.

SUGGESTIONS.

Subsoil plowing, although a means of conserving moisture, does not produce it, and is, therefore, not a substitute for irrigation where the rainfall is too small to produce crops.

Where there is a hard, dry subsoil, subsoil plowing is to be recommended.

Where the subsoil is loose, gravelly or sandy, subsoiling is probably unnecessary or may even be injurious.

Do not subsoil when the soil is very wet, either above or beneath, as there is great danger of puddling the soil, thus leaving it in worse condition than before. This is one of the reasons why it is better to subsoil in the fall than in the spring.

If the ground be subsoiled in the fall, the winter and spring rains have ample opportunity to soak in, that being the season of greatest rainfall and least evaporation.

Subsoiling in the spring may be a positive detriment if the subsoil be extremely dry, as in that case the rain water is partially removed from the young plant by the absorption of the bottom soil. If the spring rains were heavy, this would not be a disadvantage.

The effects of subsoiling land having a "gumbo" subsoil has not been ascertained, but, if done at the proper time, it would doubtless

be beneficial. The "gumbo" subsoil, to a greater extent than any other found in this state, prevents moisture from penetrating deeply into the soil, and as a consequence such lands are the first to suffer during a drouth. If the "gumbo" could be loosened, it would obviate this to a great extent.

Understand the nature and condition of the subsoil on your farm before subsoiling.

PLANT FOOD.—COMMERCIAL FERTILIZERS OR FARM MANURES.

PROF. HARRY SNYDER, ST. ANTHONY PARK.

The question of plant food, together with the most economical ways of feeding plants, is equally as important as the economical feeding of animals. In fact, it is more important because animals are dependent, directly or indirectly, upon plants for food. The feeding of plants has not required such close attention as the feeding of animals, because in a new soil plants are usually provided with an abundance of food, but when this necessary plant food is reduced to a narrow working limit, the question of food becomes a more serious problem.

In some states and localities which have been settled for a much longer period than Minnesota, the cost of plant food in the form of commercial fertilizers has reached very large figures. In many states the sale of commercial fertilizers is regulated by law, so as to prevent the practice of gross frauds. New Jersey, in 1893, expended $1,650,000 in commercial fertilizers, and many other states proportionately as large, if not larger, sums. There is expended annually in the United States not less than $40,000,000 in commercial fertilizers.

The extensive use of these commercial articles has created a great deal of interest in regard to their value. Under the horticultural and agricultural conditions of this state, but little, in fact, nothing is heard about commercial fertilizers. Inasmuch as they are so extensively used in other states, we are naturally much interested in regard to them, especially in relation to the following questions:

1. Is the present use of commercial fertilizers necessary?
2. Will they produce crops which have a greater food value?
3. Can their use be put off or possibly avoided?
4. How do the commercial fertilizers compare in value with ordinary manures?
5. What kind of fertilizers are best adapted for certain crops?

These questions are easier to ask than they are to answer, and, before taking up any of them, let me say that our exact knowledge in regard to many of the topics is not so complete as could be desired—in many cases it is quite fragmentary, but we must look the question squarely in the face and discuss it as fully as our knowledge will allow.

A commercial fertilizer is a mixture of various materials which are supposed to be rich in the elements of plant food. The elements which are the most necessary for plant growth are nitrogen, phosphoric acid, potash and lime. In commercial fertilizers these ele-

ments are present in various proportions. No two brands of commercial fertilizers are exactly alike. Commercial fertilizers are concentrated forms of the most necessary elements of plant food; sometimes this food is of good quality, and, then again, it is of poorer quality.

1. Is the present use of commercial fertilizers necessary? No, not on an average soil. The reason for saying "no" is that the additional yield of the crop would not pay the cost of the fertilizer used. In the states which have been compelled to make use of commercial fertilizers, there was not originally as much plant food in the soil as is present in the average soil of our state; hence, our stock of plant food to begin with is much greater; and then, too, we can profit by the experience of older states. The liberal use of farm manures prepared so as to be strong in certain elements of plant food, will prove much more economical and will keep the soil in better condition than the indiscriminate use of commercial fertilizers.

The greatest difficulty that we will have to contend with is that of getting the soil out of condition by using up the organic matter too rapidly and then being compelled to resort to commercial fertilizers in order to keep up the supply of available plant food. Although the organic matter itself does not take any direct part in feeding plants, *indirectly* it takes a very important part. The one weak point about commercial fertilizers is that they furnish but little organic matter for the production of humus, and hence they are generally of only temporary benefit to the land.

2. Will the use of commercial fertilizers produce crops of greater food value? Yes, but not sufficient to warrant their use for this purpose alone. It is true that the composition of a crop can be influenced by the supply of plant food, just as the composition of the animal body can be influenced by the food consumed; but commercial fertilizers from $25 to $40 per ton are too expensive to be considered for this purpose. I do not wish to be understood as saying that we do not need to use any fertilizers, or manures, but we have no use at present for the expensive commercial fertilizers. If they can be obtained cheap enough, all right; if not, we must look to other and cheaper sources of plant food.

In connection with the effects of fertilizers upon the composition of the crops produced, the extensive experiments of Laws and Gilbert, of Rothamsted, England, are the most conclusive. In a series of experiments carried on for twelve years with nine different kinds of manures, including those rich in nitrogen, phosphates and potash and their various mixtures, in no case was the essential food products in any of the crops sufficiently improved or altered to warrant the use of any of the fertilizers for simply the additional food value of the crop produced. A complete chemical analysis was made of the crop from each plot for each of the twelve years. The experiments upon this point are particularly interesting. The results are given in a table as follows:

EXPERIMENTS BY LAWES AND GILBERT, OF ROTHAMSTED, ENGLAND WITH VARIOUS KINDS OF FERTILIZERS UPON POTATOES.

Average yield per acre for twelve years when each of the following manures were used.	Good.		Small.		Dise'sd		Total.		Composition of 100 lbs. of fresh tubers.			
	Tons.	Cwt.	Tons.	Cwt.	Tons.	Cwt.	Tons.	Cwt.	Water.	Dry Matter.	Ash.	Nitrogen.
Unmanured	1	13½	...	5	..	1¼	1	19¾	71.90	28.1	.84	.334
Superphosphate	3	5	....	5⅝	....	2¾	3	13⅜	73.20	26.8	1.07	.249
Mixed Minerals	3	7¾	....	4⅞	....	2⅝	3	15⅜	74.05	25.5	1.11	.236
Ammonium Salts	1	17¾	...	6⅛	....	1⅞	2	5¾	73.08	26.2	.77	.384
Sodium Nitrate	2	4⅝	....	5¼	...	2⅝	2	12½	73.05	26.5	.75	.392
Ammonium Salts & Minerals	5	18⅞	....	7¼	....	8⅜	6	14½	74.04	25 6	1.02	.319
Sodium Nitrate and Mixed Minerals	5	17⅜	....	6⅜	....	9¼	6	13	74.02	25 8	1.00	.341
Farm Manures 6 years / Unmanured 6 years	3	12½	....	6½	....	3¾	4	2¾	72 09	27.1	.93	.298
7 yrs. Farm Manures and Superphosphates / 5 years Farm Manures alone.	4	7⅛	....	6⅜	....	4⅞	4	18⅜	74.01	25.9	1.00	.292
6 years Farm Manures alone. / 6 years Superphosphates & Sodium Nitrate	4	15⅜	....	6⅛	....	9¾	5	11¼	74.09	25.1	.93	.339

3. Can the use of commercial fertilizers be put off or possibly avoided?

Yes, by putting something back in the soil for everything that is taken away. We cannot expect to continually borrow from nature and never pay anything back. The fact should be kept in mind that the four elements, nitrogen, phosphoric acid, potash and lime, are the ones which are drawn upon to the greatest extent by plants.

Lime is present in nearly all of our soils in sufficient amounts so as not to cause any present or future trouble.

By a judicious use of farm manures, the working supply of nitrogen and phosphates can be kept up. Manures rich in phosphates and nitrogen can be produced by looking carefully after the food stuffs which are fed on the farm. Beans, shorts and barley all produce manure which is more valuable than manure from animals fed on corn or oats. As long as the organic matter in the soil is kept up, the want of available phosphates will not be severely felt. The humus in the soil formed from the decaying organic matter unites with the complex and insoluble phosphates in the soil and converts them into forms which are available as plant food. It is cheaper to work over the insoluble phosphates in the soil, and, by means of the humus, get the phosphates into an available form, than it is to purchase available plant food in the form of commercial fertilizers. There is a good stock of unavailable phosphates in the soil which should be worked over before resorting to commercial fertilizers.

The question of keeping up the working supply of potash in the soil is a more difficult and serious one than that of the phosphates. A judicious and liberal use of all of the available supplies of wood ashes will do a great deal towards solving a part of the problem. There is a great difference in the value of ashes from various sources. No doubt a few who have made a trial of the ashes from

sawmills have but little faith in ashes. As a rule, the ashes from sawmills, excepting where hard wood is burned, are quite poor in quality. The fuel is burned with such a strong draft that only a small amount of the heavy sandy portions of the ash is left, and then after these ashes have been exposed to a few leaching rains there is not much of any value left in the ashes. Samples of such saw-mill ashes are frequently sent to the chemical laboratory of the experiment station for analysis. The analysis of one of these samples, which represents about their average, showed:

Potash, 1.20 per cent.

Phosphoric acid, 1.10 per cent.

This is about ten times less potash than is usually found in good wood ashes.

In deciding between the use of wood, coal or gasoline, the fertilizer value of the wood ashes should be kept in mind.

The ashes from marshes which have burned over in the summer are sometimes quite valuable, especially when the ashes are from small timber trees. When the ashes are mainly of sedges and swale grass they possess but little value.

Another source of fertility which can be drawn upon in time of need is the large deposit of muck and marl in the state. In the "old lake bottoms" there is a large amount of reserve plant food which can be utilized at little expense. Every hundred pounds of ordinary black muck contains from 1.5 to 2.5 pounds of nitrogen, with smaller amounts of phosphates and lime. These muck beds, when they are cured by thorough rotting and airing, are valuable fertilizers. In case the muck tastes a little sour, lime in the form of land plaster should be mixed with it, so as to correct the acid and make the muck decompose more rapidly. Muck will work well on our sandy loam soils, because there is sufficient lime in the soils to prevent the formation of sour mould.

When there is a large amount of coarse sand in a soil, a dressing of marl, which is quite common in many parts of the state, will be very beneficial. The mixed marl and muck will go well together.

The use of city garbage and refuse matter has been advocated for fertilizer purposes. The rich stable manures, wood ashes and bones are very valuable, but the bulky refuse matter, containing a large amount of grease, possesses little value, and in many cases they are a positive damage to the land.

The indiscriminate use of raw city refuse matters, excepting stable manures, bones and wood ashes, has never proved a wise, satisfactory or economical method of fertilizing.

4. How do the commercial fertilizers compare in value with ordinary manures, as well as topic 5, "What kinds of commercial fertilizers are best adapted for certain crops," can not at present be satisfactorily answered on account of the absence of extended experiments upon these lines. So far as our limited knowledge goes, commercial fertilizers have not proved to be particularly valuable and beneficial under the horticultural and agricultural conditions of this state.

In short, the use of the expensive commercial fertilizers can be put off and even entirely avoided by a judicious use of: (1), farm

manures; (2), wood ashes; (3), bones; (4), prepared muck; (5), marl; (6), by keeping up a supply of organic matter in the soil.

DISCUSSION.

Mr. Hitchcock: I would like to ask Mr. Snyder a question or two. I am digging out some muck from a marsh. I would like to ask how it would do to mix tankage with the muck?

Prof. Snyder: It will do very well if you only use a small amount. It must be used with a great deal of care.

Mr. Hitchcock: I have been using a great deal of tankage. Where is the most available place to get sulphate of potash and muriate.

Prof. Snyder: I do not know in this state. It can be bought in New York.

Mr. Hitchcock: I know where to get it in New York, but the freight is too high. Have you ever had any experience in mixing tankage with the muck?

Prof. Snyder: Not in this state under our conditions here.

Mr. Hitchcock: What is the price of tankage now?

Prof. Snyder: It used to be sold at $12.00, but it is now sold at $18.00 per ton.

Mr. Pearce: Which is the best, the muriate or nitrate?

Prof. Snyder: The nitrate would be the the best, but it is too expensive. The muriate contains a much smaller amount of potash than the nitrate.

Mr. Pearce: What would be the price of the nitrate?

Prof. Snyder. It would cost us not less than $35 to $40 per ton. I doubt whether we could get it at that price.

Mr. Pearce: What would the muriate cost?

Prof. Snyder: $10 to $15 less.

Mr. Pearce: I want about three minutes to talk on a subject of vast importance to every fruit grower in the state of Minnesota. I have experimented a good deal with fertilizers, and I know the good results of these fertilizers on fruit. If we are raising fruit, we can just as well double the amount per acre we are getting now and of the best quality. So far as ashes are concerned, there is no use in trying to get what we want. The fertilizers we want and must have we must ship from New York. We want potash. Every fruit grower that is interested in fruit should be interested in this matter of increasing the quantity and quality of our fruit. We must buy our fertilizers by the quantity and get them at wholesale rates, and we must have them shipped by the carload. That means that we can

get them for one-half less, and we will reap in the increased quantity of fruit from five hundred to one thousand per cent. If there are any fruit growers here who wish to talk this matter over, I should like to meet them to talk this matter over, and let us ship a carload and see what the result will be. I think that is the only way in which we can make fruit growing as profitable as it should be. We cannot depend upon our fertilizers here; we must have them in a more concentrated form.

BARRELING APPLES.—Many of the most profitable operations in commercial life depends in the first instance upon very simple facts. Most persons would pass by without observing the barreling of apples as a case in point. If apples were placed loosely in barrels, they would soon rot, though passing over but a very short distance of travel; and yet, when properly barreled, they can be sent thousands of miles—even over the roughest ocean voyage, in perfect security. This is owing to a fact discovered years ago, without any one knowing particularly the reason, that an apple rotted from a bruise only when the skin was broken. An apple can be pressed so as to have indentations over its whole surface without any danger of rotting, providing the skin is not broken. In barreling apples, therefore, gentle pressure is exercised so that the fruit is fairly pressed into each other, and it is impossible for any one fruit to change its place in the barrel on its journey. Apples are sometimes taken out of the barrels with large indentations over their whole surface, and yet no sign of decay. In these modern times, we understand the reason. The atmosphere is full of microscopic germs which produce fermentation, and, unless they can get an entrance into the fruit, rot cannot take place. A mere indentation without a rupture of the outer skin does not permit of the action of these microbes. This is a simple reason why the early observation enabled the barreling of apples to be so successful.—*Meehans' Monthly for August.*

A good wash for a tree is as beneficial as the currycomb for the horse, as the bath for a man—perhaps more so. Strong soapsuds, lye and whitewash seem about equal in their good effects. For small trees the application may be made with a rag tied to a stick—the boy can do it—but for large trees the spray pump would be best. For killing bark lice, the spraying should be done just after hatching time in the spring. Under the scale there are thirty eggs, more or less, not as large as hen eggs but similar in appearance. As these hatch they appear as very minute white specks around the shells, and they spread and attach themselves to the bark and form new scales. They exhaust the vitality of the tree and ruin it if very numerous. They are sometimes destroyed by extreme cold weather, and I do not know that they are troublesome in Minnesota. Once in Wisconsin I saw the snow in an infested orchard covered with scales toward spring.—*E. H. S. Dartt.*

FORESTRY AND EVERGREENS.

WM. SOMERVILLE, VIOLA.

Forestry.

Forestry in its full meaning of usefulness as a moderator of summer heat and winter's cold and the influence it has on springs, wells and water courses, is of too great a magnitude for me to attempt to discuss. Laws should be enacted and means provided, by government or state, to save our natural forests from the unnecessary destruction of the axman and the devouring element of fire. In this article I will only try to show, from my experience, the best method of planting and care.

It requires the judgment of parties living in different parts of the state to fully understand the nature of the soil and the varieties of trees adapted to such soil. You can take the eastern part of the state for one, two, three or four tiers of counties along the water courses that empty into the Mississippi, and all that is necessary for their growth is to keep out the fire, and in a few years there will spring up a heavy growth of timber, such as burr oak, jack oak, poplar and ash. Even away from the water courses, on the prairie, the soil is better adapted to the growth of timber than in the western part of the state, in consequence of the groves of timber that protect from the wind. The evaporation is less, as there is the big woods, or, in other words, the Mankato timber, running from southwest to northeast to the park region or big timber northeast of St. Paul, then a heavy belt of timber on Root river on the south, and other small belts of timber on the different water courses. With the cooling influence the foliage has on the wind, partially retarding its velocity, this part of the state scarcely ever has what they call hot winds in Dakota and in the western part of the state; if felt at all, it is in an ameliorated form, not doing much harm. With these advantages and individual enterprise, this portion of the state is well supplied with fuel, posts, and timber for many purposes.

But in the western part of the state the climatic conditions are not so favorable, neither can we expect large groves of timber planted by individual enterprise, though on every one hundred and sixty acres of land there should be at least fifteen or twenty acres of timber. This can be accomplished in a different manner from what was generally practiced in setting out the tree claims. They would stick in cuttings and expect a tree, but it did not come. If we want to grow timber, we must obey nature's laws as near as possible. If we want to grow hard timber like the oaks, we want to plow the ground in the fall and then in the spring draw furrows four feet apart, same as for potatoes, and then plant the acorns in the furrows two feet apart along the row, cover with dirt two inches deep, and keep the ground well cultivated with shallow cultivation, leaving the surface as level as possible. Do this for two years and then cover the ground over three or four inches deep with old straw or slough hay or anything else that will check evaporation. As they grow, we must thin out. We must have our acorns on hand, as they have to be gathered in the fall and can be planted at that time. It is bet-

ter to put them in damp sand in the cellar until spring; they generally have started to grow by that time, so you can judge better what to plant. Jack oak is the most vigorous grower; white oak is the next best; burr oak is a slow grower.

In 1873, 1874 and 1875 I was with Leonard B. Hodges where we followed this method of planting with success, and those trees are forty or fifty feet high at Willmar, Morris and Benson and other towns along that line of road. It is best not to set out in any one year more than we can care for properly; then keep adding on each year, and we will soon have a fine grove. This grove, if possible, should be on the north and west of our buildings, so as to protect ourselves and stock from the cold blasts of winter.

Then there is soft wood that will grow and come in use much sooner. The box elder when planted close together make a very good timber perfectly hardy, and with care will grow in any part of the state. The cottonwood is a fast grower and a valuable timber, but is best to be planted from seedling trees and not from cuttings, as it requires a vast amount of water to supply their vigorous growth. Nature has designed them to have a seed, or taproot, running deep into the ground for water, which they have not got from a cutting; and with the water supply it receives from that tap or seed root it keeps life in the tree that could not be retained through a dry time with surface feeders, such as they have from cuttings.

The white willow tree has been a godsend to the prairie portion of the eastern part of the state. There is no timber that will give as quick a return as will this tree. For fuel it can be set from cuttings in a row from eight to twelve inches apart, making a good hedge. A better way, if you can get them, is to get poles and plow a furrow like for potatoes where you want your row; then lay the poles along in the furrow and cover up, and there will be sprouts from the poles sufficient to make a hedge row. There is vitality enough in the pole to keep life and growth in the sprouts to carry over a dry spell that would be liable to kill the cuttings. There is the white ash, a fine and useful timber of slow growth, but it is worthy of cultivation for its timber and usefulness for mechanical purposes.

Evergreens.

For windbreaks and ornamental purposes and beautifying your homes, there is nothing that fills the place of the evergreen. The foliage always remaining on the trees, always green and bright, enlivening the surroundings and a protection from winter's storms, we can have them to beautify our yards, shaping them to suit our taste. We can have them as trees one hundred feet high with foliage from the ground up to break the winter blasts. It is impossible to overestimate these trees as a windbreak around farmers' buildings. Evergreens are supposed to be slow of growth; this depends on the care you give them. While I am writing this article, surrounded with evergreens, I can look out of the window and see the balsam fir, the white and Norway spruce, white pine, arbor vitae, red cedar and Scotch and Austrian pine. A portion I set out twenty

years ago are now by actual measurement seventy feet high and five feet in circumference. I do not call that a slow growth for timber.

In the western part of the state we must select from those varieties that are best adapted for western soil. With the experience I have had by running a small evergreen nursery for sixteen years or more and shipping to different parts of the state for trial and otherwise, I have found the Scotch pine universally give the best satisfaction. It is a very fast grower and can stand more drought than any other variety I have a knowledge of. The white spruce is next in order. In my opinion, it is the best of our common varieties of evergreens. The Norway spruce is a fine tree but not adapted to all soils. The arbor vitae is a beautiful tree but like the Norway spruce not so well adapted to different locations and soil.

The care necessary for success in planting evergreens is first: Do not get large trees—from twelve to eighteen inches is as large as you want them, and once or, better, twice transplanted. Get them from a responsible nursery where care will be taken. When first taken up do not expose more than necessary to the sun or wind and when received use the same precaution, as it will not do to have the roots long exposed to sun or wind. Get them early in the spring, so that they can get started to grow before the drought of summer comes on. It is the best way to have the ground prepared and take the box you receive them in to the field. Take out one at a time and put in the ground. It is well to have some water, and when you put the tree in the hole dug for it, put dirt on the roots and then put a quart of water in and lift the tree up and down until you get the roots well mudded. Cover with dirt, leaving the tree two or three inches deeper than it came out of the nursery row; then mulch with rotted manure to stop evaporation. If very dry through the summer, it is well to move the mulch and loosen the ground around the tree, putting back the mulch.

In extreme cases of drought it may be necessary to water; if so, take away some of the ground near the tree and water the roots well, but always leave dry ground and mulch on the surface; in fact, the key to the whole tree planting business is to stop evaporation and keep the ground as cool as possible. This can only be accomplished by thorough cultivation to form a dust blanket or by mulching. Mulching in my opinion is the best. In buying trees always patronize our home nurseries, and you will always have better results. Do not undertake to raise from seed, for that requires experience, when you can buy them by the hundred at from six to ten dollars, once transplanted.

The poor farmer needs a good winter crab. It must be free from blight, hardy, productive, of fair size and good quality. How nice to have three or four barrels in the cellar to be brought up by the panful all winter long for stewing, baking and eating from the hand! Liberal premiums will bring out good apples, but a committee should examine the trees, for many a fine apple grows on a half dead or a non-productive tree.—*E. H. S. Dartt.*

REPORT ON EVERGREENS.

D. T. WHEATON, MORRIS.

As I understand it, I am expected to report upon the condition of evergreen trees in this part of the state—not to give theory but facts.

Such being the case my report will be very brief—evergreens being few and my observations of the same being limited. It is only now and then that a single stray evergreen can be found growing on the prairies, and there are many townships without a solitary growing evergreen. Occasionally, there is a prosperous wideawake farmer who has a windbreak of evergreens or one growing, but the most of the farmers have not a tree. Most of the evergreens are found in the towns and villages, where they add much to the beauty of the place, and not on the prairies where they are most needed, showing clearly that expense and care are necessary to secure evergreens.

The reason there are so few evergreens is not that no trees have been set out but that so few live after being set out. Most of the evergreens are purchased of itinerant pedlars and are seedling trees that have been pulled from the woods. Many of the trees are dead before they are set out, and the rest are but little better. Only a few live at all, and most of these never amount to anything. When small nursery grown trees with good roots have been set out with good care, they have generally grown well. There is no good reason why evergreens should not be found around every farmhouse. Care and attention they must have, or the probabilities are that they will not grow.

Some twenty years ago the railway company passing through this place set out some evergreens—they may have received some care for a year or two, but since then they have had no care whatever. For some years it was a struggle for existence. Most of those left standing are fine trees from twenty-five to thirty feet high. There does not seem to be any good reason why evergreens will not grow and do well.

Rabbits have caused me the most trouble in growing small evergreens. They will soon clean out a bed of small trees. They also damage larger trees when the snow drifts around them so they can get to the small limbs. Trees of any kind are a great addition to the comfort of living on the wind-swept prairie. Evergreens are doubly so.

It does not seem as though any farmer after experiencing the difference between the windy prairie and a good evergreen shelter-belt would delay longer to set out such a belt around his own buildings.

As to the best evergreens to set out, I think almost any of those recommended by this society are good. There are nearly all of these kinds growing finely on the prairie. The Scotch and white pines and the white and Norway spruces are the kinds most commonly found growing.

EVERGREENS FOR SHELTER.

A. V. ELLIS, AUSTIN.

(Read before the annual meeting of the Southern Minnesota Horticultural Society.)

"He who plants a tree, plants a hope," so wrote the poet, and I would add to that, not only does he plant a hope but a constant joy, which in Minnesota, at any rate, we may call a shelter.

If thirty years devoted to the study and propagation of evergreens be sufficient excuse for me to intrude my views and experience upon this assembly, then I feel at liberty to present the following short and very incomplete paper.

Plant evergreens for shelter in preference to any deciduous trees, always. First, because they give you shelter when shelter is most needed. The foliage is as dense in winter as in summer, which is not true of any variety of deciduous trees. Second, because of their rapid growth and protection from winds and storms almost from the beginning. The cottonwood, willow and balm of gilead give little or no protection until four or five years old, and the first and last named little after. A cottonwood is moreover a dirty tree, inasmuch as it sheds its cotton annually, the wind blowing it about the yard and making it during its shedding season a nuisance. It sticks to everything, and it is hard to get rid of. The cottonwood will perhaps grow more rapidly, but it does not produce so bushy a top as the evergreen and, consequently, has not so much value as a windbreak. The willow makes a better shelter than the cottonwood, but a belt of Scotch pines two rods wide is, in my mind, worth forty rods of willows to protect you from a Minnesota blizzard. Third, an evergreen belt, besides being a prime shelter, is a thing of beauty and an attractive decoration to any farm or city lawn. This is noticeably a fact in the winter time when all other trees are bare. There is something unspeakably cheerful in a spot of ground which is covered with trees that smile amid the rigor of winter and give us a view of the gayer season in the midst of that which is most dead and melancholy. How warm and cosy a fair sized bunch of evergreen trees looks after, for instance, riding for miles across the bleak prairies with no sight of trees except an occasional willow or cottonwood windbreak bending sear and cold in the wintry blasts.

As to the variety of evergreen best adapted for purposes of shelter, probably the Norway spruce deserves first place, for it is hardy and a fast grower, and its foliage and limbs will grow thick if a little care is taken in training the growing tree. The Scotch pine comes next—it is doubtless much more hardy, but it is also much more homely. Its foliage is coarse and not so dense as that of the spruce, moreover the twigs and limbs are not so tough but a big fall of heavy snow will often break them. Again, even in planting trees we must not consider youth and beauty so much as old age—the latter of which is the longest age in the life of a tree. The Scotch pine grows ugly as it grows old, while the Norway spruce holds well the beauty of its youth.

The American white spruce in my estimation makes a handsome tree with a richer, thicker foliage than its sister of Norway, but I cannot think it quite so hardy. My white spruce are all protected and are as vigorous as any trees I have, but I hardly think unprotected they would stand the fierce storms of wind, snow and ice, our Northern inheritance from nature, so well as the Norway spruce.

The Austrian pine is too uncouth after it gets its growth to have a place among the more refined varieties of evergreens, while the white pine, less widely known, is the king of pines. Its soft foliage, its more tender green and its beauty of form should make it a more general favorite.

These,I think, are the varieties best adapted to purposes of shelter.

In regard to planting a belt of trees for a windbreak, I have observed the following rule with satisfaction. Place the trees eight feet apart in the row and the rows from sixteen to twenty feet apart. The trees of the second row should be planted so as to break the intermediate spaces of the first row. I consider three rows a good windbreak, but even one or two will shelter. Trees from one to three feet high will be found the best for setting. It is with trees as with children, they should be well looked after when young, carefully trained and cultivated, and when old they may be left to care for themselves, and they will rise up and call you blessed.

It seems to me in such a climate as this, the man who does not protect his home from the storms of winter and the heats of summer by these guardians of nature, is neither wise nor economical. Not only are they a shelter from wind and cold and heat, but from disease as well—for leaves, we are told, absorb all noxious qualities of the air and breathe forth a purer atmosphere.

Even a few rows of trees will greatly check the movements of the winds. They will protect not only the farmer but the crops in his fields and the fruits in his orchards. They will prevent them from being blasted or withered by cold or hot winds or from being broken down by the force of the same. And while you shelter, make the shelter beautiful by planting the tree called *Evergreen*—the tree which does more to turn our winter into summer than any tree that grows.

To some is given the power to rule, to others the power to write, but to all is given what Whittier so beautifully describes when he says:

"Give fools their gold and knaves their power,
Let fortune's bubbles rise and fall;
Who sows a field or trains a flower,
Or plants a tree is more than all.
For he who blesses most is blest;
And man shall own his double worth,
Who toils to leave as his bequest
An added beauty to the earth."

A VIEW IN HORTICULTURAL HALL, MINNESOTA STATE FAIR, SEPT. 1885.

THOUGHTS ON FORESTRY. (A TALK.)

D. R. MCGINNIS, ST. PAUL.

Ladies and Gentlemen: The splendid papers read do not leave much for me to say on this subject; they have covered the matter more thoroughly and in a more practical manner than any papers I have ever heard on the subject of forestry. There are a few things I might add that may shed a little more light on the situation In the first place, have you ever reflected how little of the world is entirely forest? Take a map of the world where the forest portions are colored green, and you will see as a rule there are little narrow strips of green nearest the oceans.

It is, I regret to say, a fact known to those who investigate it, that the water supply upon the land surface of the earth is diminishing. I will point to only one or two cases in point. Fifty years ago there was a lake covering four thousand square miles in southwestern Siberia; that lake does not exist today. In the southern part of Siberia there was a lake into which a large drainage system flowed; that lake fifty years ago had an outlet navigable for steamboats; about eight years ago that lake ceased to discharge any water. Within a comparatively short period of years, our water system in this state has been remarkably depleted. Devil's Lake in North Dakota has, to my own knowledge, fallen eight feet since I was there in 1882. When the city of Devil's Lake was started by J. J. Hill in 1882, he found the depth of water in the bay eight feet, and he said they would start the town there; today that bay is dry land.

I do not wish to look at this matter from a sentimental standpoint; it is a practical matter. Observations do not prove that rainfall is increased by forests, except in the very slightest degree. It is the office of the forest to preserve what rain does fall from being idly evaporated into the air, and this moisture soaks into the earth and fills our lakes, ponds and wells—and that is the work, the most important work which the forest performs. We must look at the practical aspect of this case. You have got to look at this forest question from a financial aspect. I can prove to you that if you will set out white pine seedlings and attend to them—and it is very pleasant work taking care of timber—at the end of thirty years you can sell the stumpage and make from two to ten times as much money as if you had cultivated the land to wheat. You can afford to wait thirty years to get that return. The preservation of forests does not contemplate letting trees grow up to rot down again. Intelligent forestry contemplates cutting the tree when it is ready for the uses of humanity the same as wheat is cut when it is ripe.

The solving of the forestry question depends on its preservation from fire. The axe alone will never exterminate our forests. Let the lumberman cut that timber; we need that timber, we need it for our buildings, we need it for shelter, but let us provide that the fire, which ruins, in my opinion, one thousand times as much as the axe does, be guarded against. The destruction of timber by fire is something enormous. If we stop the spread of the fire, we will find that nature will take care of timber renewal to a very large degree. The axe alone cannot deplete our forests; fire is the only agent that

can do that. It appears to me that our people are not awake to the importance of this subject. We must have the friendship of the lumberman in this matter, because he is equally interested with us. We must not regard the lumberman as an enemy to our forests, but we must work hand in hand for the protection of our forests against fire, and when we have done that the problem will be practically soived.

KEEPING HONEY AND THE WAX MOTH.

C. THEILMANN, THEILMANTON.

In order to obtain the best honey possible,it must be fully ripened. Some beekeepers manage to get a crop of surplus honey, but don't know how or take time to take proper care of it after they take it from the hive. Some take it off too early, and others wait until it is all yellow,or what is called travel-stained. They do not heed the wise man's advice, "there is a time for everything," which means that we should do everything at the right time. This is one of the most important points in any occupation; we can not make the best success at anything, unless we do it at the right time. Especially must we be prompt and very particular about everything in the apiary.

Much of the honey put on the market is condemned by the consumers as adulterated, because the beekeeper has spoiled his otherwise nice honey by his mismanagement, to the injury of himself and of his brother beekeepers. Much more honey would be consumed and better prices paid if all the honey was managed rightly Comb honey should not be taken from the hive until all or nearly all of the cells are capped over. except when the honey season is over then all the surplus receptacles should be taken off immediately,and all sections unfit for market should be extracted,and both comb and extracted should be put in an airy, well ventilated, warm, (seventy-five to eighty degrees above zero) room for four to five weeks, when the honey becomes ripe and marketable. Honey treated in this way will greatly improve in quality and flavor and will keep good for years. Cold, damp places are unfit in which to keep honey good.

THE WAX MOTH.

It is a rare thing to find the worms or moth in comb honey when treated as above mentioned, unless there be some pollen or beebread among the honey whereon they feast. To my observation there are three kinds of moths that trouble some bees and their keepers, though I never had much trouble with them.

One of these moths is a dark gray,almost black,one and one-fourth inches long by about one-fourth inch thick. This species is very destructive when they get hold of a queenless colony; they gather in big nests in the pollen and honey filled combs, eat pollen, wax and honey and increase their nest and web rapidly, until nothing is left but worms and webs. As far as I know, the winged moth lays her eggs on the combs where they hatch.

The second species is a whitish gray about one inch long and about one-tenth of an inch thick. This moth is the most destructive enemy to the apiary; the bees—at least some colonies—seem to hatch and nurse them when young. After they grow large, they live on the capped brood; they make regular roads under the cappings of the brood, webbed in so it is hard for the bees to get at them. Every pupa of the bees is webbed fast in the cell where these roads are made, and it is hard work for the bees to free themselves from the cell after they mature. The wings and abdomen are crippled by the web, and the young bee is thrown out by the workers. The black, or German bees are more apt to tolerate this moth than the yellow races, though they are found in all strains. This moth lays its eggs mostly on the flowers which the bees visit and they are gathered by the bees with the pollen and stored in the cells and are hatched as above described.

The third species is a very minute white moth and is found on surplus comb honey. It is about one-eighth of an inch long and the size of a common sewing needle. It appears only under certain conditions—when the honey is stored in a damp, close, hot room with no ventilation. In 1888 I had about 12,000 pounds of honey taken out of the hives and stored in a hot, close room for about four weeks, when I noticed signs of little mildew spots on the cappings. A close investigation showed these little moths. In some places the cappings had many little holes the size of a sewing needle, and but few worms could be found, except here and there one in the pupa state.

Since then I have kept my honey room airy, ventilated and warm and have not been troubled with this moth. This fall I bought a lot of nice comb honey from one of my neighbors; on examination we found this honey badly infested with this moth; considerable of it full of these little holes as if punctured with a needle as close as it could be done. The holes were only in the cappings, but it made it unsalable, though few of the worms could be found. This honey was also left in a close, warm room with no ventilation for over two months.

REPORT ON BEE CULTURE, 1894.

C. THEILMANN, THEILMANTON.

Bees, as a whole, wintered exceptionally good, last winter; very few died, and most of them came out of winter quarters in a healthy condition. I lost only one colony out of 225.

The spring was not very favorable for bees, being too cold; although near forest timber, they got enough to make a living and gradually filled the hives with brood. The white, alsike, red and mammoth clover all suffered badly by the heavy frosts about March 26th. Most of the clovers were killed outright; the weather being unusually warm (82° above) the fore part of March, vegetation started growing, especially the clovers, and the hard freeze following killed most of it. This made a big gap in the honey bearing plants, and the bees could hardly make their living until the linden, or basswood, commenced to bloom about June 28th, which it did abundantly,

and lasted twenty-one days. This was longer than usual, and it occurred only once before here in twenty-five years. From six to twelve days is the usual length of time linden trees are in bloom. The linden was the only bloom which gave surplus honey to any amount, and the bee-keepers had to manage their bees skillfully in order to get the best results.

I obtained about forty-five pounds of surplus honey per colony, spring count, from the linden. I kept the bees from swarming as much as possible. Where the bees had their own way, but little surplus was obtained. After the linden was through blooming, little surplus was gathered, but most of the bees in this vicinity filled their hives well with winter stores of very good quality. The weather being very dry the honey is ripened fully, which has much to do with successful wintering. In the state there was hardly half a crop.

DISCUSSION ON APPLES.

FROM REPORT OF LAST ANNUAL MEETING.

Mr. Clark: I have a farm in North Dakota. Would it be impossible to raise trees from planting seeds?

Mr. Philips: Well, if I were a young man like you, I know of no better way to raise an orchard than to plant three or four trees of the Virginia crabs and then topwork a half hardy variety on them. I could not find anything better than the Virginia crab for that purpose. If I was a young man, I would start an orchard.

Mr. Pearce: You struck the nail right on the head.

Mr. Clark: How is the Transcendent for stock?

Mr. Philips: It is not as good as the Virginia. Two years ago I sent to Prof. Roberts of Cornell University three different kinds of apples. I sent him two kinds grown on the Virginia crab and the Transcendent, he wanted to see if there was any difference in quality of the fruit, and he said if there was any difference it was in favor of those grown on the Virginia.

Mr. Brand: Why is it that a variety originating at a certain place will do well in that locality but will not do so well in another?

Mr. Philips: I cannot tell. I have thirty trees of the Wolf River and they are doing well, but there is no place in Wisconsin or Minnesota where they bear better or look better than in Waupaca county where the tree originated, but I cannot tell you why it is so. I think the water helps the trees. Take it in Wisconsin and one-half of the apple trees are starving to death for want of moisture. That old Wolf River tree stands

in a most unfavorable position. The roots are right in the water. Our trees do not get as much water as they want.

Mr. Wedge: What is the most reliable indication of hardiness that we can get in regard to those new varieties with these rather mild winters?

Mr. Philips: I like to see them have good solid wood. I have not found anything that has as good wood as the Dominion Wonder from Canada.

Mr. Wedge: If one tree ripen up its wood more thoroughly than another the indications would be strong that it was hardier?

Mr. Philips: Yes, that would be my idea.

Mr. Harris: Have you seen a tree called "Murphy's Greening?"

Mr. Philips: Yes; it stands near the Murphy's Blush. It is not as good an apple as the Blush. Mr. Chappell thinks a good deal of it, but the tree does not look as well as the Blush.

Mr. Harris: It is a good apple, but not as good as the Blush.

Mr. Philips: I shall topwork the Murphy's Greening. The Patten's Greening has looked very well with me; I think it looks very fine.

Mr. Wedge: Would you grade it for hardiness with the Oldenburg or the Wealthy?

Mr. Philips: I don't know that I would.

Mr. Wedge: Would it grade about with the Wealthy?

Mr: Philips: Yes, nearer than with the Oldenburg.

Mr. Wedge: The Wealthy is much the better apple; if it is not hardy, we have no use for it.

Mr. Philips: It blights a little. I discard everything that blights. Those varieties that are bad blighters I discard. As much as I have seen of the Repka, it grows very small.

Mr. Somerville: I find the Repka the hardiest of everything I have, hardier than the Duchess.

Mr. Ferris (Iowa): Mr. Tuttle recommended it to me as the best thing he had.

Mr. Philips: He has recommended that and a good many other things that he thought well of. He told me at one time that the Russet Red was the coming winter apple for Wisconsin and Minnesota. He said it was going ahead of anything there was in existence. I bought all of the trees, because I thought it was a good thing. I have since grubbed them all out. Any man that will show it at a fair ought to be prosecuted. Mr. Tuttle does not grow any.

Mr. Dartt: Is it the men or the trees that change? (Laughter).

Mr. Philips: Both.

Mr. Harris: I want to say one word in regard to that Patten's Greening. Wherever the McMahon will succeed it is as good as Patten's Greening, and in quality there is not much difference. After you get west of Filmore county, the McMahon is not a safe apple to plant; Patten's Greening is a good deal better.

Mr. Bracket: Will young trees planted in the vicinity of the parent tree do better than if planted in other localities?

Mr. Philips: I never said so. I said that where the parent tree is doing well in the soil, there was less risk in setting out young trees of the same variety.

NOMENCLATURE AND SEEDLINGS.

MONTHLY REPORT OF COMMITTEE, J. S. HARRIS.

A basket of apples was sent to us for names by J. M. Underwood, of the Jewell Nurseries, Lake City. The varieties were placed in separate paper bags and marked by letters of the alphabet. Letter E was the Russian variety named Arabka. Fruit large, conic: skin deep green, overlaid with a covering of purplish red and a dark bluish brown interspersed with numerous small brownish dots; flesh greenish white, coarse, sharp acid quality, only medium. The tree is a vigorous, upright grower and apparently hardy. The season is said to be from December to March.

F is Scott's Winter; origin, Vermont; when well grown, the fruit is of medium size, handsomely shaped and splashed with dark red; flavor rather acid for eating—its principal value is for cooking; its season is from February to May; ranks in hardiness about with the Wealthy. It is most valuable as a top graft and a hardy stock.

J is doubtless the Malinda. A medium sized, long, conical apple; color light green becoming yellow when mature, often with a light blush cheek; a long keeper and a fair quality of sweet apple if properly kept. The tree is almost as hardy as the Wealthy but very long in coming into bearing unless topworked onto hardy stock. Virginia crab or Hibernal apple make good stocks for it.

K is the Walbridge, valuable only as long keepers. Have not tested it topworked.

N is a variety known as the Montreal Peach. Tree very hardy; fruit medium size, round conical, pale yellow with light blush cheek; season same as Duchess, quality better. It will not bear shipping.

We were unable to identify the remaining varieties.

At our state fair and at the Wisconsin state fair, there were some interesting exhibits of seedlings, which we will report upon at the annual meeting of our society.

FLIES.

PROF. OTTO LUGGER, ST. ANTHONY PARK.

Your active secretary gave me a rather peculiar text for a paper. I do not quite understand why he should have selected such a theme, as he assuredly knows that "there are no flies on" Minnesota horticulturists! Or did he perhaps mean to indicate that they are constantly on the fly, meeting here and there in our beautiful state. But whatever were his reasons, I will try to give you the true history, habits, diseases and other troubles of our great tormentor, the house fly. Perhaps, such a paper should have been read at a time when the supply of flies exceeded the demand for them, and not now, when, as the commercial papers have it, the market in flies is dull. To study flies we should have them about, so that they could be seen, heard and felt, as lessons are only well learned by studying the objects themselves.

The history of the common house-fly has been studied thoroughly but quite recently. The memoirs of the Swedish Count, DeGeer, published a little over one hundred years ago, contain the first notice of this interesting insect, while a fuller account was given in an obscure book by Bouché, a German entomologist, published in 1834. Both accounts are far from thorough. Dr. A. T. Packard published his prize essay upon this insect in 1874, this being the first real scientific work upon it. About the same time the question came up: Is our fly identical with the house-fly of Europe? Strange to say, when this question arose in mid-winter, all our museums were ransacked for specimens for comparison, and to their great disgust it was discovered that not a single fly could be found in any American collection of insects. There was a corner in flies—perhaps the first and last time in history. Later material was not lacking, as Dr. Packard could not find any difference between house-flies from different countries.

How long this fly has been living in this country there are no data to show, and it may have been a passenger on the Mayflower, or buzzed in the cabin of Captain John Smith's vessel, or even performed its measured flight near the ceilings in the ancient town of Pemaquid. At all events, the house-fly is one of the earliest settlers and is entitled to the liberty it takes every summer with the upper Four Hundred of New York. Perhaps, it may have been here before America was discovered, or, when Christopher Columbus wiped his brow upon landing on our shores, it was ready to settle upon his nose. The fly is impudent enough to have done so, though our history has not thrown light upon this subject.

During the month of August the house-fly is particularly abundant, and especially so in the neighborhood of stables. On placing a fly in a glass bottle she laid, between 6 p. m. Aug. 12, and 8 a. m. next morning, 120 eggs. They were deposited irregularly in stacks, lying loose in two piles at the bottom of the bottle. At 8 a. m. of Aug. 14, several were found hatched out and crawling about. The egg of the house-fly is long, cylindrical and a little smaller at the anterior end than at the other. It is .04 to .05 of an inch long, and

about one quarter as thick. The shell is very dense. The eggs thus laid hatch twenty-four hours after being laid—in confinement they required from five to ten hours more, and the maggots hatched in confinement were smaller than those reared from eggs deposited in warm manure. For several days the worms living in this dry manure did not grow, sensibly. For lack of direct warmth, but more especially the want of sufficient moisture and, consequently, of available semi-liquid food, seemed to cause them to become dwarfed. It is evident that heat and moisture are required for the normal development of the fly, as they are for nearly all insects.

The maggots molt twice, consequently there are three stages of development, and they become sensibly larger at each stage. After feeding six or seven days the larva is nearly full grown; its body is long and slender, somewhat conical ,the head and mouth parts being rudimentary; the end of the body is truncated, and bears two short tubercles, or spiracles, which contain circular breathing holes with sinuous openings, the edges of which are armed with fine projections, forming a rude sieve for the exclusion of dust and dirt. When about to transform into the pupa state, the body contracts into a barrel-shaped form, turns brown and hard, forming a case,within which the larva transforms into that of the pupa. Our house-fly having as a maggot lived a life of squalor, immersed in its revolting food, appears after a short pupa-sleep of from five to seven days, as a winged being, with legs and wings where before there were no traces, and is animated by new instincts and mental traits.

If in its winged condition it is one of the most disagreeable features of dog-days, and people wonder why flies were ever made at all, it should be remembered that flies have an infancy as maggots, and the loathsome life they then lead as scavengers cleanses and purifies the August air and lowers the death-rate of our cities and towns. Thus, while stables and other filthy places are tolerated by city and town authorities, the young of the house-flies and the flesh and blow-flies, with their thousand allies, are doing something towards purifying the pestilential air, averting the summer-brood of cholera, dysentery, diphtheria, typhus and typhoid fever which descend like harpies upon the devoted towns and cities. It may be regarded as an axiom that where flies most abound there filth, death-dealing and baneful, is most abundant, and filth diseases such as just mentioned most do congregate.

When the fly leaves its pupa-case, it pushes away the front end of the case, which opens like a lid, by means of the distention of the membranous front of the head, which may be seen pushing out and in as the fly walks rapidly about. When free of its prison, the fly runs nervously about, as if laboring under a good deal of mental excitement and quite dazed by the new world of light and life about it, for as a maggot it was blind, deaf and dumb. Now its wings are soft, small, baggy and half their final size. The fluid that fills them soon, however, dries up, the skin of the fly attains the colors of maturity, and it soon flies off with a buzz suggestive of contentment and light-heartedness born of its mercurial temperament.

When we consider that each female fly may deposit as many as one thousand eggs, and that in the course of one summer we may

have from seven to nine generations of flies, it should not astonish us that these winged tormentors appear as by magic. The question, why do flies appear suddenly and in such immense numbers, may be answered by the statement that they multiply in geometrical progression,and that a single female in suitable seasons and surrounded by plenty may produce such a number of offsprings in one year that it will require thirteen figures to express it. There are millions in it! But flies have not in everything their own way, as will appear later. As soon as the nights become cool, flies try their very best to find shelters for the winter, and no matter how carefully we may protect door and windows with screens they will find an entrance, to the great worry of our better halves. Sufficient numbers would thus find a shelter if they did not bring with them at the same time an enemy they cannot escape, and one that will kill the very great majority of all house-flies. Only a few escape this general slaughter, and these few are the ones that may be seen during the winter in our houses; others will find wintering quarters under rubbish or remain in a torpid condition until the warm weather of spring coaxes them to life. Most flies that escape death in autumn winter over in their winged form; a few may also hibernate as pupæ, though this is doubtful, at least in Minnesota.

Have you ever observed a genuine house-fly, one with a full pedigree? This question seems absurd, but my experience has been that really few persons can tell the difference between a house-fly and other flies so common in our houses. All flies found upon our walls, upon windows and tables, are called house-flies, yet at least a dozen species are mixed up in that congregation, all widely different, more so than cows and horses. One of the most curious habit of the genuine Simon-pure house-fly is its peculiar position during sleep, and once observed it will always be recollected. When we enter a dark room all flies are sleeping, but only the house-flies sleep with their heads downwards, the others in a more normal position. By bringing a light in the room, you may count very rapidly the number of true house-flies or that of other intruders. Notwithstanding our intimacy with the fly, or rather its intimacy with us, how very little is really known of it by the plurality of tormented humanity. Those present always excepted, not 10 per cent of our fellow citizens even know how many wings or legs a fly has nor where it spends its early days in infantile sports. How many know why it so suddenly appears in countless numbers to torment the masterpiece of creation, not caring a straw when or where to attack him? The minister in church as well as the public speaker, during some of their most eloquent passages, must scratch their noses as well as the poor laborer, who diligently or otherwise digs trenches for a new gas company. A study of the proboscis of the fly reveals a wonderful adaptability for its uses and misuses. In this proboscis, we see a fleshy tongue-like organ, bent up beneath the head when at rest. The maxillæ are minute, their palpi being single pointed, and the mandibles or jaws, are comparatively useless, being very short and small, compared with the lancet like jaws of the mosquito or horse-fly. But the structure of the tongue itself

(labium,) is most curious. When the fly settles upon a lump of sugar or other sweet object, it unbends its tongue, extends it, and the broad knob-like end divides into two broad, flat, muscular leaves which thus present a sucker-like surface, with which the fly laps up the liquid sweets. These two leaves are supported upon a frame-work of tracheal tubes; these modified tracheæ end in hairs projecting externally. Thus the inside of this broad, fleshy expansion is rough like a rasp, and, as Newport states, "is easily employed by the insect in scraping or tearing delicate surfaces." It is by means of this curious structure that the busy house-fly occasions much mischief to the covers of our books by scraping off the albuminous polish and leaving tracings of its depredations in the soiled and spotted appearance which it occasions on them. It is by means of these also that it teases us in the heat of summer, when it alights on the hand or face to sip the perspiration that exudes from and is condensed upon the skin. The microscope reveals wonders quite unexpected in such a common insect as the house-fly, but it would take too much time to describe them now and in detail.

The very fact that flies run over our skin in search of liquid food is sometimes the cause of diseases. Bad ulcers, caused by some contagious diseases, are visited by flies whenever they have an opportunity to do so. Being a hairy insect, and having upon their feet sucking pads, bacteria found in such sores must adhere, and, if another person is visited in turn, such disease spores will be carried to his skin, and should conditions be favorable the germ of disease thus brought there will not be slow to act. I had an opportunity some years ago to study the eggs of a tapeworm. These eggs were counted and covered with a watch glass. A piece of freshly cut beef was put in another part of the same, the watch glass was removed to give the houseflies access to the eggs, and soon afterwards some of them were detected upon the flesh, showing that even larger objects could be carried about by these insects.

During the months of October and November—never in December, but mainly during the early part of November—it is a very common occurrence to find the house-fly dead, adhering to walls, window panes and other poor conductors of heat, firmly fixed by its proboscis, and with the legs spread out in quite an unnatural manner, thus differing from dead flies in general, which have the legs contracted. In about 24 hours after death a kind of fatty substance of a white color is found in the form of a ring projecting out between each of the rings of the abdomen, and in a day or two after the whole will be found dried and the surface of the wall or glass lightly covered in a semi-circle, at about ½ to 1 inch from the fly's abdomen, with a cloud of whitish powder. This whitish, fatty substance is found on examination to consist of a vast number of short, erect filaments growing out from the interior of the body of the fly, between the rings. These filaments contain large oil globules, often arranged in a row, and their having been mistaken for spores gave origin to the name of *Sporendonema*, applied to this fungus. Mr. Cohn has described its growth somewhat minutely and changed the generic

name to *Empusa*, or rather *Empusina*, the first of these names being already occupied. He states that the vesical filaments terminate in the abdomen in a continuous,often branched tube and consist therefore of a single tubular cell. The upper free end, however, becomes cut off by a septum, and the terminal cell acquires a companulate form and a dark color; when ripe it is thrown off with some force, and a number of these form the white cloud above mentioned. You have all no doubt observed this halo or oriole. It always reminds me of pictures of certain mediaeval saints in old books; after having led a more or less saintly life in some wilderness or cave, they died either of old age or self-inflicted starvation, or were pinned up like an insect by some heathen (not an entomologist); but the old masters never failed to paint them with this halo of light surrounding their reverend heads, thus indicating their belief that light never could penetrate any further in that particular direction.

Mr. Cohn endeavored in vain to make them (spores not saints) germinate; and nothing like them were found in the cavity of the abdomen of numerous flies in which the filaments were traced in their earlier stages. Mr. Griffith inclines to regard them as peridioles or spore-cases; or they may be stylospores, which after a stage of rest produce an intermediate mycelial structure, and then give birth to the ripe spores.

When we turn our attention to the poor sufferer,we observe no outward signs of the disease in its early stage; yet observing carefully great numbers of flies we soon detect some that differ from the rest by a more erect abdomen and by their awkward method of walking. At first they are restless,constantly running and flying about. If the disease, however, grows worse,their motions become very sluggish and if you approach them with your finger they either do not fly away at all or in a very clumsy way, soon settling again. At last they are unable to walk more than a few steps. About an hour before they die,all intentional motion ceases,and the fly fixes its proboscis firmly to the object it happens to have settled upon, only the legs spasmodically contract and extend in a very unsymmetrical way. The abdomen gradually swells and shows on its underside a whitish color; the upper surface of the insect, however, does not change at all, and no trace is as yet visible of the white rings between the segments, nor is any white dust to be seen. Gradually all motion ceases,and the animal is dead. After death the abdomen still swells, and about eight hours later it is so much extended that the segments are pulled apart, and the fine connecting skin between them becomes visible. And here a white substance gradually is pushed out from the interior, so that eventually three white and parallel rings or belts are formed. The first trace of loose dust becomes now visible under the insect. The fly remains unaltered in this condition for several days, only that these belts become more prominent and frequently a white ring is also visible between head and thorax. The dust around the dead fly becomes denser, the corpse eventually dries up, the white belts disappear, and the body shrinks, so that the fly appears as a living one, though wings and legs are covered with dust. Thus far all the symptoms could be followed with the naked

eye, but the microscope alone can give us an explanation of the whole process.

Being afraid that by this time you will be thoroughly sick of the Empusa, I will not inflict upon your patience the microscopic history of the influenza, another disease that attacks our poor domestic fly. It goes by the name of *Isaria*, was first discovered by Meigen, and has but one good point about it—it kills flies.

To wind up this already lengthy discourse upon diseases of flies, let me only mention some other enemies—besides yourselves—of this troublesome intruder to an afternoon's snooze knowing that it will please you to hear that the life of a fly is far from being an eternal round of constant revelry and pleasure, but that it is also troubled in more than one way. Besides several true worms (*Nemetodes*), it is preyed upon in Europe by two kinds of ichneumon flies whose larvæ feed inside of its host, also by a fly-parasite (*Astoma parasiticum*). It is a pity that these useful parasites have not as yet been introduced into this country. We possess, however, already one fly-parasite in this country (*Astoma musearum*). You all have, no doubt, seen small red dots upon the base of the wings of our fly. This red dot is the parasite just mentioned, and let us hope that it may increase at the same ratio as all his relatives are in the habit of doing. Of course we all include

"Mosquito, old back-bent fellow,
In frugal freize coat drest."

in the wish expressed above, and it is a great satisfaction that another species of Empusa attacks it. Good speed to it!

IRRIGATION IN MINNESOTA.

There is such a dearth of water during the dry seasons these years and when our agricultural and forest crops most need it, resulting in poor harvests, that the matter of irrigating our farms and gardens must be considered. Necessity drives us to provide some way by which the surplus water in the spring, usually rushing in destructive floods and reacting into severe drouths, can be conserved and economically distributed. The state legislature has not estimated geodetic surveys as of practical importance enough to have them done on the scale which our necessities demand. It is certain that were all the water falling from the clouds and gushing from the springs and running to waste, harbored in ample reservoirs at or near our numerous watersheds, and thence made to flow over our lower lands, under proper management, the uncertainty and cankering anxiety about our crops and trees would be ended, and their abundance increased almost beyond measure. Where the reservoirs should be established, will have to be determined by competent surveyors.

IRRIGATION IN EASTERN MINNESOTA.

It is believed the water-falls on the St. Croix, St. Louis, Mississippi and their tributaries, can be so controlled by dams and canals as to supply a large proportion of the farms in the eastern part of the state.

IRRIGATION ON THE PRAIRIES.

Doubt obtains as to irrigation to any practical extent in the prairied portion of our state. We should calculate the fact that it requires but slight descent for successful irrigation, and then where this is not naturally obtainable it pays largely to force water up to required height, as is done in some farm districts among the Rocky Mountains, where actual deserts are thus speedily converted into Edens.

RESERVOIRS ALSO IN WESTERN MINNESOTA.

According to the annual report of Maj. W. A. Jones, of St. Paul, engineer in charge of the government works on the rivers of the Northwest, a great reservoir system on the Red and Red Lake rivers is unquestionably feasible. The Major has already established five great reservoirs among the headwaters of the Mississippi, and now suggestively proposes an extension of the system.

"It is well known" says the Daily Herald, of Grand Forks, N. D., "that the northern portion of the state of Minnesota, and especially the portion directly east of the Red River valley, is composed, to a large extent. of a vast number of small lakes, besides Red Lake, which is of considerable area. These lakes comprise a number of great water basins forming the head waters of the Mississippi and Red rivers. The waters east of the "divide" going to the Mississippi and thence to the Gulf of Mexico, while the waters to the west of the same divide, eventually find an outlet through the Red river to Hudson's Bay. The topography of the territory comprising the head waters of the Red river is shown by the investigations of Major Jones to be admirably adapted to permit the formation of a large storage reservoir, which will not only allow the vast quantities of water which occasion the spring floods to be held in check, but admit of the same water being utilized in increasing the volume of water during the dry seasons. Red Lake can be utilized in the same manner as a storage reservoir by the construction of dams at the outlet of the lake, which will raise the water two feet above its normal height when needed, and also by means of dredging permit the water in the lake to be lowered two feet when needed to keep up the volume of water in the river. Major Jones is confident that by the judicious arrangement of dams and the reservoir system proposed, not only will the inconveniences from floods and low water be largely done away with, but the Red river will be made navigable throughout the season from spring to freeze-up in the fall and the Red Lake river will be made navigable to the entire distance to Red Lake."

WHERE CONSTRUCTED.

In concluding his report, Major Jones says:

"An increase of 1,000 cubic feet per second to a low water discharge of 350 per second would render further operations under our project for improvement unnecessary and make an exceedingly fine line of water transportation.

"In order to furnish this increase to the volume of discharge, the waters from the watershed of Red Lake could be assembled in one reservoir, and those from Otter Tail might be gathered in Lake

Traverse as a reservoir by means of a dam at Breckenridge. This would seem to be a feasible and economical method of solving the question of the Red River of the North permanently, and hence I consider the matter worthy of the favorable attention of the government. In order that it may be fully investigated and the estimates called for submitted, a survey will be necessary, for which purpose, I estimate, the sum of $6,000 will be necessary.

AREA OF THE RESERVOIRS.

Maj. Jones estimates the area of the Red lake reservoir at 1,930 square miles with 9,000,000 cubic feet of water for each square mile, or 17,370,000,000 cubic feet of water output in one year. The area of the Lake Traverse reservoir is estimated at 2,450 square miles, or 22,050,000,000 cubic feet of water. He further estimates that this would add an average of 2,000 cubic feet of volume to the Red river at Grand Forks in low water, giving a navigable draft of 5½ feet below this city to the boundary line.

NAVIGATION OPENED.

Again quoting from the conclusion of Maj. Jones' report:

"There is still another aspect to this matter. The stored-up waters in Red Lake river distributed uniformly during the open season through Red Lake river would render it navigable for small craft. One or more dams and locks at the falls near Thief river and at Crookston, would enable boats to pass up to the reservoir dam; passing this by means of a lock, they could proceed to the head of the lake. From this point to Rainy Lake river, there is a marsh all the way, a distance of fifty-five miles, and hence a canal could be cheaply constructed across, and an outlet via Crookston and Grand Forks would thus be afforded for the timber and other products of the extensive Rainy Lake country, which at present has no outlet in the United States."

The object these gentlemen have in view is the navigation of the waters mentioned. But a weightier question arises—whether the reservoir and canal system proposed can also be applied for irrigation; probably not, if navigation only is to be promoted, for there might not be water enough to go round. But the interests of agriculture, which includes forestry as its prime factor, takes the precedence of navigation. Were the reservoir system extended as Maj. Jones suggests, and used mainly to head a vast irrigation system, under right forestation of the spring lands, it would pay a hundred fold more to the people than navigation at its most prosperous times of commerce. There is no call for such navigation unless our crops warrant it, and to warrant it agriculture must have special rights here, even if navigation must then fall back to the rear.

Hand pollenization of apples has been practiced for many years, its advocates believing that they can thus secure perfect crosses. This might be done but for heredity. As far as I know, no valuable varieties for Minnesota have been thus obtained. Give us an orchard of best adapted apples and crabs and a few swarms of bees, and we will get more valuable crosses in a day than can be secured by the hand of a bungling man in a lifetime. It is not best to waste time in trying to search out the hidden mysteries of God unless a professor has *nothing else to do.—E. H. S. Dartt.*

MY FOUR BEST RUSSIAN APPLES.

J. B. MITCHELL, CRESCO, IOWA.

(Read at a meeting of the Southern Minnesota Horticultural Society.)

I shall have to plead guilty of ignorance in not knowing which are "My Four Best."

I could make several lists of four kinds each and still be undecided as to which was the best, but if I were to make a dozen I should put Leiby, No. 230, alias Recumbent, at the head of each list To me it has no fault, in tree or fruit, except to eat from the hand. Its other good qualities are sufficient to make this defect insignificant when selecting for this latitude. The tree is hardier than the Duchess, as free from blight, grows rapidly, coarse and stout and is a good bearer, the fruit keeping well towards spring.

To select kinds for the other three places is more difficult. Yellow Transparent (No. 334) should be in every orchard on account of its early and prolific bearing of fine looking fruit, although it is less hardy than some others. Like many others, it has its near relatives so much alike in fruit that I am not sure of being right in selecting it. Juicy Streaked, 330, or White Queen, either might well take its place.

Lubesk Queen has no apparent relative and no rival in its beauty of fruit, it being a purple pink on a ground of waxy white; quality, medium; tree straight, well formed and hardy and a prolific bearer. A plate of the fruit at a county fair would exhaust the stock of trees in the nursery.

Yellow Sweet, 167, should be included in Northern orchards because of its hardiness and quality. It is sweet, of medium size and keeps better than I had given it credit for. The tree is not a rapid grower, but is straight and smooth and has a well-rounded head. It is not an early bearer.

Rattling Apple is another sweet apple and one that will keep well into spring, but to select it in place of the above would be to lose largely in quality of tree.

Lieby (Recumbent), Yellow Transparent or one of its relatives named, Lubesk Queen and Yellow Sweet would be four, either of which I would dislike to omit from a list of four best when the object was to get distinct kinds combined with hardiness of trees.

Bergamont and Lead Apple, or Wargul, as in my list, belong to a family of several which appear to be the same variety. The two named are at least as good as any of that family, and it may be unwise not to include one of them in a list of four best. The trees are thrifty growers and good bearers and among the most hardy. The fruit is of good size, yellow, medium quality, but I think not as late keepers as claimed for them.

Thaler may when older claim the place of Yellow Transparent. As most have the Thaler, I think it is no more or less than the Yellow Transparent; as I have it, the tree is darker in bark, of more rapid growth, freer from blight and endures cold better, but does not fruit as early. Color, when first ripening, yellow, nearly covered with pink stripes, but if left on the tree until they drop the color is nearly a solid, deep red.

Nos. 231, 264, 268, 272, 445, 558, 874 and 971 are all of the Alexander type, and are large, handsome, red apples, looking enough alike to be the same. They ripen about with the Duchess. The trees are tall, stout and fast growers. They bear often at four or five years. They will stand the most severe winter test, but are quite subject to blight.

If I were writing without the experience of the winter of 1884-5 and in the light only of the past five or six, others, later keepers, would be given a place with the best. As it is, I am not sure of my choice, and, as in the past, I am still looking in the future to know which are "My Four Best Russian Apples."

GRAPE TRELLISING.—T. V. Munson, of Texas, has done much for grape culture. His system of trellising is a minor item of his work, but a very important one. It has been the subject of comparative tests at the Oklahoma Experiment Station, and has proven so successful that Prof. Waugh unhesitatingly recommends it for general adoption. In this system the posts stand six feet out of the ground. At the top a crosspiece, two feet long, is nailed, and at each end of this a wire is run. A third wire is run through the middles of the posts eight inches below these two, so that the three wires set in a sort of a broad V shape, nearly six feet from the ground. This great height is an essential feature of the system and should not be modified. On this trellis the grape vines spread out like they do where they grow wild in the woods. This furnishes a shade for the fruit, At the same time the fruit is so far above ground as to be safe from the intense reflected rays of the sun, which is apt to cause damage in the hot summers of the arid region.

Once upon a time the writer of this paragraph was invited to a nursery celebrated for its large business in connection with the growing of water plants, or, as they are commonly called, aquatics. As the locality was far away from lakes or ponds, much curiosity was felt as to how the large quantity of plants was cared for. It was found that nearly everything was being raised in old kegs or barrels sunk deep into the earth, and where water could be led into them by a hose or other methods. The hint may be taken advantage of by those who read of the beauty of aquatics, but do not have lakes or ponds of their own to grow them in. Old paint kegs or any vessels that will hold water can be buried partly in the earth, filled with water, and seeds sown, or young plants planted in mud placed at the bottom of the water. Many of the smaller kinds of water plants can be grown in this way without any serious difficulty. The vessels need not be water tight.

Professor Webster, of the Ohio Experiment Station, has been making experiments to determine whether honey bees are injured by spraying fruit trees with the arsenites while they are in bloom. These tests seem to show conclusively that bees are killed in this way. Apart from the destruction of the bees and the consequent loss to the apiarist, this would seem to be a bad policy for the fruit grower, since the presence of bees is acknowledged to be of great value in securing a crop of fruit by their work in pollenizing the flowers.—*Garden and Forest.*

GRAPE EXHIBIT AT MINNESOTA STATE FAIR, SEPTEMBER, 1895.

"THE MINNESOTA HORTICULTURIST."

BY WYMAN ELLIOT, MINNEAPOLIS.

Response to a Toast at the Banquet concluding the last Annual Meeting.

"Our reports taken in homoeopathic doses regulate the system and create a healthy circulation."

When that renowned scholar and physician, Samuel Hahneman, the founder of the system of homeopathy, discovered, in 1790, the wonderful and various effects his medicines produced upon the diseases of mankind and in the method of administration, either by concentration, size or frequency of the dose, he little thought of the radical change and reviving influence this discovery would have in moulding the concrete ideas of mankind in the next century. Especially in the method of directing whatever they had to offer, in a more concentrated form—if not always sugar-coated—in quantity and quality, that would make it a more attractive dose.

When he discovered that a drug had produced upon man in health the very symptoms which were required to cure a man in sickness, it immediately suggested to him the law, similia similibus curantur (like cures like).

So, reasoning from analogy, when our large doses of horticultural reports had been sent forth, year after year, receiving recognition from the people, the press and our friends, only in limited manner, your executive board sought to learn the reason why their attempts for educating the masses were not more appreciated. The quality of the goods was all right—"all wool and a yard wide"—, but where was the trouble? They soon discovered that, like the medicine of the old school physician, given in massive doses, notwithstanding it generally cured, it sometimes produced opposite results; and after a long and laborious diagnosis of signs and symptoms, your board came to the scientific determination that what our members and the public at large most needed to enlist them in the way of accepting our horticultural literature must be given in small digestible doses, and, lest harm might ensue, wisely decided to divide the usual yearly dose into twelve powders to be given monthly, always insisting upon their positive purity and educational qualities; and, like the renowned Hahneman, watch their circulatory effects upon the horticultural system.

This experimental work, though not by any means considered perfect, being yet somewhat crude, has accomplished wonderful effects upon the thinking masses,and, not unlike the first steps in selecting the favorite homeopathic drug suited to the disease, it must be given in the proper form by an able and energetic editor to always meet the exigencies of the case and produce the crowning results by aiding the circulation and the receiving of the almighty dollar.

To give you some idea of the appreciation of our monthly after a few months trial, I will quote a few of the kind words that have been written by our patrons, selected through the kindness of our secretary, out of many he has received since we launched our horticultural bantling under his energetic and organizing ability as secretary and editor.

Commendations of "Horticulturist."

"It is not at all too much to say that the change to a monthly doubles the value of the reports."

"It is with considerable pleasure I read the monthly report of the society."

"I am pleased with the magazine, it is just what I have been wanting."

"I heartily endorse the idea of sending out a monthly paper instead of a report only once a year."

"Your magazine is a splendid idea and deserves a large circulation."

"I am well pleased with the Horticulturist and think it is doing a grand work."

"I like the "Minnesota Horticulturist" ever so much, just what I have long wanted. It is of cash value."

"Am pleased with it."

"Success to the Minnesota Horticulturist."

"I like the Minnesota Horticulturist ever so much."

"So able and so full of good things."

"The monthly Horticulturist is, indeed, a good thing."

"I am more than pleased with the Horticulturist."

"We like the Minnesota Horticulturist so much we wish others to enjoy it, too, and receive its benefits."

"It is a very creditable publication, and I think that the grant for your work should be largely increased by the state, in order that you might be able to spend more money upon it."

"I think the new departure of your society, in publishing a magazine, a wise move."

"The idea of publishing the report as a monthly magazine is a good one. There is sad need of a reliable horticultural publication for our section, and I hope the Minnesota Horticulturist will do much to meet this want. Your state cannot expend money that will do more good and be of more permanent benefit to its people than to help support this publication and make it a good one."

"It is certainly a credit to the editor, and a valuable acquisition to horticultural literature. It is worthy of the support of every horticulturist in Minnesota and adjoining states, and we hope it will have as large a circulation as it deserves."

J. C. Plumb, of Milton, Wisconsin, contends that what we gain in breeding for hardiness we lose in size and quality. If he is mad, he is not without method. Corn gets smaller towards its northern limit, and lofty trees do not thrive at the top of high mountains. We will always accept the inevitable when we are obliged to. We greatly prefer nice, sound, medium sized apples, of fair quality and of home production, rather than the scabby things shipped in the past season. We are inclined to accept Plumb's theory, just for the time being, on size, but on quality we will try to beat the world.—*E. H. S. Dartt.*

PEAR BLIGHT.

The Secretary of Agriculture gives the following suggestions relative to pear blight: Pear blight is caused by a very minute microbe which enters the tree at the blossom cluster or at the tip of the tender growing shoot. It may destroy only the blossom cluster or a few inches of the twig, or it may run downward several feet, killing large limbs or even whole trees. *The same microbe causes apple twig blight* and quince blight. Most of the damage from this blight is done during the first month of growth, beginning at blossom time. After running downward for a few inches or a foot or more, the disease usually comes to a standstill. When it has stopped, a definite crack forms in the bark, separating the live and dead portions. When the diseased portion blends off into the live part, it shows that the disease is still progressing. Below the blighted portion the tree may be perfectly healthy, as the blight kills only as far as it reaches. Healthy, thrifty, rapidly growing trees suffer more when attacked than those not so vigorous. In certain cases the blight does not stop, but keeps on slowly growing in the bark till the close of the season. After this such cases continue progressing slowly, the new blight for each year coming from germs which lived over from the preceding season's cases. The remedy for the pear blight is to exterminate the microbes which cause the disease. This can be done by pruning out the old blight in the fall or winter, thus preventing the microbes from living over. In mild attacks, where there is but little blight, and wherever practicable, it is best to cut out the blight as soon as discovered. Complete destruction of the blight should be carried out in the fall as soon as all late growth has ceased. In cutting out the blight, care should be taken to cut on the sound wood below the disease.

SOME SEASONABLE HINTS.—The greedy fruit grower hesitates to thin his apples, pears, peaches or similar fruits, looking only to quantity as his reward; but the edible quality of the fruit of the overbearing tree is never good. Those who have the courage to thin their fruits in the early stage of growth not only get larger and finer fruit but also fruit of better quality. In the pear tree, one who tries the experiment will be surprised to find how vastly superior in quality is a pear from a tree in which a large number were thinned while the fruit was still young. The proper time to commence thinning is as soon as the fruit commences to swell. Nature herself throws off large numbers which she feels she will be unable to bring to perfection, and in a week or so after this has taken place will be the time for the good gardeners to help her still further by thinning out some of the rest.

FERTILIZERS A SOURCE OF DISEASE.—In a recent bulletin Prof. H. J. Webber says in substance that some diseases including those caused by insects are "apparently influenced by the use of fertilizers, *organic* manures rendering the trees more liable to injury from this source than *chemical* fertilizers." It would be interesting to experiment with the blight along this line.

Biography.

DITUS DAY, FARMINGTON.

The subject of this sketch, whose portrait was given in the September Horticulturist, was born in Wilbraham, Mass., Oct. 10, 1817, making his present age seventy-eight years. He comes from good old Puritan stock, his first ancestor in this country, Robert Day, having come across the ocean in the bark Elizabeth from Ipswich, England, in April, 1634, and settled in Cambridge, Mass. From this ancestor Mr. Day is in the eighth generation.

His parents started for the then undeveloped West in the winter following his birth, travelling by ox team for forty-two days, and settled in Portage county, Ohio, where his earlier years were spent. In 1836 he was engaged in teaching in his neighborhood, which pursuit he followed successfully until he came to Minnesota.

Mr. Day came to Minnesota in the fall of 1855 and purchased the claim in Farmington, Dakota county, on which he now resides. The spring following, on his return from a visit to his old home, he brought back a quantity of seeds, cuttings, etc., which he planted, and the same spring bought a few seedling apple trees, one of which bore a few apples about 1862. He has always been very much interested in horticulture from that time to the present, and is strong in the faith that Minnesota can and will raise as good fruit as can be found anywhere. He is especially interested in the State Horticultural Society, in which he has been an earnest working member since 1868. He says that "he feels proud of it, and intends to retain his membership and attend its meetings as long as the infirmities of age will permit." Mr. Day has been treasurer of the society for a good many years, until the date of the last summer meeting, when he deemed it best not to continue the responsibilities of the office longer. His resignation was accepted with sincere regret on the part of his co-laborers in the work.

Mr. Day has been twice married. His first wife, Cordelia Bissell, to whom he was married August 26, 1840, died December 19, 1844. He was married again August 16, 1849, to Clarissa Harris, who survived until January 13, 1889. There are three sons and two daughters now living.

An indication of the esteem and confidence bestowed upon Mr. Day in the neighborhood where he resides, is the fact that he has been elected town clerk there for thirty-four years consecutively, with the exception of two years at one time, and still retains that office.

November Calendar.

J. S. HARRIS, LA CRESCENT, MINN.

The work of November in the orchard and fruit garden is as important to successful horticulture in this climate as that of any other month of the year. A man may plant in the spring and dress and prune and keep everything in the best of order all summer long, and all be done for naught if the autumn work is left undone. The "Ice King" is surely coming with certain death to many of our fondest hopes following in his wake if we are unprepared for him. This coming has been heralded by biting frosts and blustering winds sent as advance pickets from his summer home in the polar regions, and no time should be lost in making his coming harmless to us.

Drainage is essential for the best results in orcharding. Tile draining may not be necessary with most orchards in this state, but the water from heavy rains must not be allowed to stand around the trees for it is liable to cause bark-burst by freezing and thawing and even to rot the bark at the base of the tree. Suitable surface drains should be provided to quickly carry away all surplus water. Low places that cannot be thus drained should be filled by grading up.

Suitable protection must be provided. For mice, cleaning up brush, leaves, weeds and all rubbish that can afford them hiding places and then throwing up a little mound of earth about the base of the trees, is almost certain protection,and especially, if when deep snows fall, it is tramped down about the trees. For rabbits, binding cornstalks or lath about the trunks or winding them with strips of cloth, strong paper or even hay ropes will answer the same purpose and incidentally afford protection against sun-scald and even winter killing. The whitewashing of trunks and larger branches, alluded to last month, will make the remedy even more effectual, especially where the heads of the trees are not above the reach of vermin. Search for the runways of rabbits, and make feeding places for them by placing shallow boxes containing corn and oats in their way. Later, when snows come, trap them in steel-traps, box-traps, or deadfalls. Often a small bounty promised to the boys will induce them to watch the runways on bright moonlight nights and shoot them as they come to the feeding places.

Either every tree should be kept correctly labeled or a plat of the ground made and the name and location of each tree marked upon it. Now is a good time to examine and readjust labels, and, if platted, note on the plat the condition of each tree—names and locations are easily forgotten after the labels are gone unless these precautions are taken.

The orchard should be fenced in so securely that it will keep out all kinds of stock. Horses, cows and sheep will do even greater injury to trees in winter than in summer, and even hogs will do no more good. Young fruit trees once started are too valuable to be

subjected to browsing and horn pruning. Attend to the fence, make it secure and close the gates without delay.

Dead and broken limbs should be pruned away at once, and the wounds promptly covered with paint or grafting wax. Other pruning had better be delayed until towards spring.

Nursery stock for next spring's planting should be put into winter quarters at once, either by burying in a dry bank out of doors or packing away in a cool cellar with sufficient covering to prevent drying or freezing of the roots.

Now is the very best time for pruning and laying down grape vines. Our space does not allow of a treatise on methods. How to prune depends upon the vine and the person's knowledge of its manner of growth. The most of the present year's growth has done its duty; the buds on the cane are next spring to throw out canes to produce wood and fruit. If all are left, there will be many weak shoots and little fruit. Of this year's shoots, cut back one-half of them to two or three buds and the remainder to two feet. Stronger shoots will be grown and better fruit produced than if all are left on to run wild. Lay down as the pruning is done and cover about the time winter begins. There is no better cover than fine soil.

Lay down and cover tender raspberries early in this month.

Secure the marsh hay or other covering for the strawberries and have it on the ground and ready to apply on short notice when the ground begins to freeze up.

A good coat of manure spread over the asparagus bed at this time will prevent the frost going so deep and show good results next spring.

Vegetables stored in pits will need looking after and a gradual addition to the covering. Cellars where roots are kept should be looked after and kept as cool as possible without admitting frost and finally made frost proof when winter sets in. Manuring and plowing the garden is still in order. Good soil should be secured and put under cover for the early spring hot beds.

HOW TO REPEL FLIES.—A good housekeeper says in the Detroit Free Press, she learned a good remedy years ago from her grandmother, when watching her putting bunches of lavendar flowers around the room to keep the flies away. She says: "My method is simple. I buy five cents worth of oil of lavender at the drug store and mix it with the same quantity of water. Then I put it in a common glass atomizer and spray it around the rooms where the flies are apt to congregate, especially in the dining room, where I sprinkle it plentifully over the table linen. The odor is especially disagreeable to flies and they will never venture in the neighborhood, though to most people it has a peculiarly fresh and grateful smell."

There is no such thing as alternate fruit bearing seasons for trees. The reason they do not bear in successive years is chiefly from the fact that they have been allowed to over-bear the previous year. There is as much reason for thinning out the apples and pears, if needed, as for hoeing out surplus corn or potatoes.

Secretary's Corner.

IOWA STATE HORTICULTURAL SOCIETY.—This society is to hold its annual meeting at Des Moines, as usual, December 10, 11 and 12.

A HISTORICAL PALM.—Among the plants to be sold Oct. 24th, by the executors of the estate of Samuel J. Tilden, of Yonkers, N. Y., is a sago palm 200 years old, in fine condition, with 75 fronds three feet long. The palm was formerly in the possession of George Washington.

DEATH OF THE ORIGINATOR OF THE CONCORD GRAPE.—The originator of the Concord grape is dead. In that fruit Ephraim W. Bull has left a monument that will endure. Yet he died in poverty,though enjoying comfort in an old folks' home, where he had been placed through the efforts of appreciative friends.

PROGRAM FOR THE ANNUAL MEETING.—The program for this meeting, which is to be held this year in Minneapolis, commencing Dec. 3, will appear in the December "Horticulturist," In order to give the necessary two weeks notice as required by the constitution this number will be issued November 15th.

DELEGATE FROM IOWA STATE SOCIETY.—Hon. A. F. Collman, of Corning, Ia., is to attend our meeting as delegate for the Iowa Society Mr. Collman was for many years president of that society. We have known of him in this capacity and many of us met him at the World's Fair while in charge of the Iowa fruit exhibit there. It will be a pleasure to renew his acquaintance.

PROF. N. E. HANSEN.—Prof. Hansen, whom our members will remember meeting with us two years since as delegate from the Iowa Society, now occupies the chair of horticulture at the South Dakota Agricultural Experiment Station. We shall have the pleasure of meeting him at our coming annual meeting, and hearing of the trip he made through Europe last year in the interest of his profession.

QUESTIONS FOR ANNUAL MEETING.—If any of the members have questions they would like to have answered or discussed at the annual meeting and will send them to the secretary at once, they will be published in the December number, which on account of its containing the program of the meeting will be issued Nov. 15. This will give an opportunity for their consideration beforehand. By taking advantage of this opportunity,much interest can be added to this feature of the meeting.

HORTICULTURE AT THE STATE EXPERIMENT STATIONS.—A little idea can be gathered as to the work being done in the way of horticultural investigation and experiment at the government stations in this country by looking at the bare figures. There are in all fifty-four such stations and sixty-one persons in connection with these stations are giving their time exclusively to horticulture,combining probably, as at the Minnesota Station, imparting instruction with the experimental work. There are no figures at hand to show how many of the 401 bulletins, aggregating 4,500,000 copies, issued by the stations last year were devoted to horticulture, but a considerable portion were so occupied. Much of the information gained is necessarily somewhat impractical of application for the actual working horticulturist and is paving the way for further investigation, but a very large share is knowledge in a shape suited for present absorption and use. The influence of such a flood of fresh truth upon the horticulture of the country must be inestimable.

MONTANA STATE HORTICULTURAL SOCIETY.—We note with pleasure the organization of this society with Hon. S. M. Emery the suggestor and one of the prime movers in it. Mr. Emery is well known to most of us as an old member of this society and for many years connected with the Jewell Nursery Co.; he is at present director and horticulturist of the Montana Experiment Station at Bozeman. Like other Western societies this one starts out with vigor—and especially so in having already constructed at Stevensville a permanent exhibition hall, the property of the society. We expect to hear great things of the maturer life of so lusty an infant as this.

NORTHWESTERN IOWA HORTICULTURAL SOCIETY.—The annual meeting of this society is to be held at Hampton, Nov. 26 and 27,—so Secretary Elmer Reeves writes. We are to exchange delegates with them, but the names are not yet announced.

MINNESOTA GROWN SWEET POTATOES.—Mr. J. R. Cummings, of the western part of Hennepin county, who is one of our life members, left at my house some of the sweet potatoes he has grown this year. He wrote an article on this subject last year and has had some experience in the cultivation of this vegetable. We tested them by the usual process and found them of excellent quality, and, though not as sweet as those from the South, they were very dry and mealy and of better flavor. If such sweet potatoes can be grown in our latitude successfully, this industry should certainly be encouraged.

SPRAYING THE ORCHARD.—The last report of the Ontario Bureau of Industries in referring to fruit trees quote many letters from correspondents that contain expressions like these:

"Apple worm very bad on trees not sprayed."

"People are finding it pays to spray."

"Spraying is not common, but it is becoming more so."

"Where spraying was done, there were very few worms."

Can we draw a lesson from this?

GEO. P. PEFFER, PEWAUKEE, WIS.

Died Sept. 11, 1894.

THE MINNESOTA HORTICULTURIST.

VOL. 23 DECEMBER, 1895. NO. 11

Apiculture.

MINNESOTA STATE BEEKEEPERS' ASSOCIATION.

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Vice President, First District,—C. Theilmann, Theilmanton.
" " Second District—Mrs. B. J. Livingston, Center Chain.
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Barnard Taylor, Forestville.
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C. H. Pond, Kasson.
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G. H. Auringer, Bonnelsville.
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P. F. Bradford, Empire.
J. W. Thompson, Lester.

Honorary Members.

Mrs. Geo. N. Hart, Hagar City, Wisconsin.
Mrs. A. A. Kennedy, Hutchinson.
Mrs. J. McClane, Lake Harriet.
Thos. C. Russell, Minnehaha Falls.
Roy Underwood, Lake City.

HONEY, HOW IT SHOULD BE PREPARED FOR MARKET.

W. H. PUTNAM, RIVER FALLS, WISCONSIN.

I shall confine my remarks to the production and preparation of comb honey for the market. I do not wish or expect to impart much information to my fellow members, as most of them at least are experts in this line. The great body of beekeepers, however, are not members of this or any other association, and they are the people who need to improve in the preparation of their honey for the market.

My ideal of a package of comb honey, if a twelve pound case should weigh eleven pounds net; if a twenty-four pound case, it should weigh twenty-two pounds net. The comb of each section should be confined within the wood of the section, so that if a straight edge were drawn across its face, resting on the edge of the rim, it would not touch the comb. If honey is produced in this shape, each individual section can be removed from the shipping case without disturbing the others. Precaution should also be taken against leaking. These are qualifications which the market demands, and the successful business man *will cater* to the trade.

People in other lines put up their goods to suit the purchaser, and we must do the same if we would make money. For instance, a few years ago it become fashionable to color butter. The conservative people argued against it, and there was no end of clack and clamor about coloring butter. One of the most successful dairymen in my state favored the coloring of butter because, he said, his customers demanded it, and he added, "if my customers send in an order for butter colored blue, the next shipment will be colored blue." I make this digression to try and impress upon beekeepers that the end of all our efforts is to make beekeeping profitable, and if we would succeed we must cater to the trade. I had occasion recently to criticise a large producer of comb honey. That man raised nearly four thousand pounds of comb honey in the poor year of 1894. I bought the whole amount at the price he asked, ten cents a pound. I had difficulty in disposing of that honey because the crates were over weight and the sections where not straight,—you could not get one out without tearing the crate to pieces. When I had sold a customer one lot, I could not sell him another. I criticised my friend, the producer, stating the reason why the trade wanted the scant sections, and got the following reply: "I do not care to put up honey for the dealer to beat the consumer on if I can help it." A long argument might be had on this point, but to cut it short and state my view of the point, I will say, "Don't bite off your own nose to spite some one else; dealers don't have to buy any man's honey unless it suits them, and it will suit if they can make money on it." Moral:—*Cater* to the *trade*.

Then I may briefly state my ideal crate of comb honey to have four necessary requisites:

I. It must be scant weight. 2. Combs must be straight. 3. They must not leak. 4. The one pound is the standard.

How shall we obtain these requisities? If we would compete with Bro. Thielmann and Bro. Urie at the state fair next fall, we must lay the foundation now. If we would compete in the markets of the world, we must make preparation at home long before the bees begin to swarm.

To accomplish these points we must adopt a section that when filled full will weigh about a pound. I consider the 4¼ x 4¼ x 7⅛ in. the proper size for general use with separators, and I do advise the use of separators by the general public. The members of this association do not need to use separators; they are skilled in their profession; they look to all the points; they keep their hives level; they keep their bees strong so that when they go into the surplus case they fill it and straight combs come naturally. For such beekeepers I would advocate the 4¼ x 4¼ x 7 to the foot and a full sheet of comb foundation. The average beekeeper uses about one pound of comb foundation for a bunch of 500 sections; his bees take care of themselves; some are strong, but most of them are weak; but a few bees go into the super at first, they cluster on some section and there is a vast unoccupied space all around them; honey is coming in slowly; they draw out the comb, and there is no limit to the size—it may bulge out on both sides way past the edge of the section and weigh one and one-half to two pounds. Later, honey comes in more freely, more bees are hatching all the time, and after awhile the case is filled. Later, when the bees more perfectly fill the case, some very straight combs may be found in the same case with some very bad ones. Had this person used separators, he would have had all the combs straight, because the few bees would have occupied one or two sections somewhere in the center of the surplus case, and when they had drawn out the combs within about three-eighths of an inch of the separator, they would have capped it over and gone on to the next station. In this way the honey of no section can protrude beyond the edge of the section, and we have gained our first two points—the combs are scant weight and they are straight; and we have almost gained our third point, for when the combs are straight and do not bulge there will be very little leaking. We can guard against all leaking if we will cut a piece of newspaper an inch larger than the bottom of our shipping crate and place it in the bottom, allowing the edge to turn up all around about one-fourth to one-half inch. One more point about preventing honey from leaking: When honey is first stored in the combs, it is thin and watery; it needs to be ripened; the water in it needs to be evaporated.

Honey may be ripened on the hive; but, if it is white, it is better to remove it from the hive, because if left on the beehive the bees will run over it, and the yellow pollen will fall off from their legs and soil the combs, and the honey has to go for second quality and be sold at from one to two cents a pound less. If, however, the honey is of a dark color or is produced in a region where no buckwheat or golden rod exists, it may be ripened on the hive.

The reason why honey should be removed from the hive as soon as completed, if raised in a region where buckwheat exists, is that in the case of buckwheat honey, if dark colored and if only a few cells

of dark honey are stored around the edge even of the section, it places the whole in a second grade.

When honey is removed from the hive, never place it *down cellar;* that is the worst thing you could do, because there is always more or less moisture in a cellar. If you place your honey down cellar, I will tell you what happens. The honey takes on moisture, and, as two particles cannot occupy the same space at the same time, the cells are expanded, the capping bursts, the contents of the cells become more watery, part of it oozes out, a chemical process takes place, and the first you know that honey is all over the floor. You taste of it, and it is sour. I presume what I have just related takes place in nine-tenths of the grocery stores in the country. Grocers are in the habit of keeping their molasses, vegetables and other produce in the cellar; naturally the honey goes down there also. The honey is damaged more or less according to the length of time it has been subjected to this process of taking on moisture; the customers pay twenty to twenty-five cents for a comb for that *stuff* called honey; they take it home, and they taste potatoes, onions, codfish and everything usually kept in a grocery cellar. That fine flavor that beekeepers talk about is gone—they don't like honey, anyway. Then people talk about adulterated honey, and no wonder.

What shall we do? Ripen our honey above ground, in some dry, clean, warm room. where the air is pure, so that what surplus moisture there is will evaporate. If the weather is damp and rainy, use a stove to dry the air; then the honey will thicken and preserve its flavor. When you sell a box of honey, tell the party not to put the honey in the icebox nor down cellar, but rather put it on the pantry shelf. If your customer is a grocer, give him a few pointers in a friendly way.

And now I come to the fourth point, that one pound is the standard. The pocketbook argument should have its effect here. First, if you use an odd size you must expect to pay the supply dealer from 50 cents to $1.00 extra on a thousand, because it is more trouble to make odd sizes than regular sizes. Second, you must expect to get less for your honey. I will show you how much you would lose if you used a two pound section. Supposing two thousand one pound sections to cost at the factory $5.00, you could not expect to get a thousand two pound sections for less than $4.00, and, supposing two thousands pounds of honey to sell at fourteen cents a pounds in one pound sections, you could not expect it to sell for more than thirteen cents a pound in two pound sections; in proof whereof, I quote from the Minneapolis market report in the Minneapolis Journal, dated January 4th, 1895.

"Honey—the market is slow and prices are steady:—

Minnesota White Clover	$ .14@	$ .15
Wisconsin White Clover	.14@	.15
Dark Honey	.10@	.12
Extracted Honey	. 7@	
Two Pound Combs	.13@	.14"

Then we have saved $1.00 on the cost of the sections and we have lost $20.00 on the honey. $19.00 would be a big Christmas present.

but it would be just like finding it to a beekeeper who was in the habit of using a two pound section.

I wish to touch briefly upon how to secure the greatest amount of white honey. We hear so many beekeepers say every year that they did not get any or very little white honey. The plan generally pursued by the ordinary beekeeper is to let his bees alone in the spring until they begin to swarm, then he hives the new swarm, and after about two weeks he puts on his surplus cases. A little knowledge of honey-producing plants and their time of blossoming would change all this, for be it understood, once for all, that bees do not make honey,they simply gather it and store it in the hive. In my locality, the first surplus honey comes from white clover in May and June, followed by a short spell of no honey at all, and then comes the basswood the last of June and first of July. Basswood blossom is all over from July 10 to 15, and then comes another famine. In order to get white honey in my locality, the beekeeper must have his bees in condition to gather honey by the middle of May, he must put on his surplus cases as soon as the bees begin to build brace combs. It is my practice to tier up as fast as possible, and sometimes I have two or three surplus cases nearly filled at swarming time. As soon as a new swarm issues, I remove the old hive a little to one side, placing it at right angles to the old stand. I place the new hive exactly where the old one stood and place the partly filled section cases on the new hive, and in less than ten minutes after swarming the cases are again filled with workers. Each worker carries a sack full of honey with him when the swarm issues—and thirty or forty thousand bees can hold a considerable amount of honey.

I have weighed new swarms that weigh eighteen to twenty pounds without the hive, in fact before they had been put into the hive at all. I have no doubt that two-thirds of this weight was the honey in the bees. With me bees swarm during white honey flow, and by following the method here described no time is lost—they go right on, and more cases may be added. Meantime the old hive is moved nearer and nearer the new hive, day by day, until they stand side by side and very close On the seventh day after swarming, in the middle of the day when the most workers are in the field, quietly and carefully pick up the old hive, carry it quietly and set down softly at the greatest distance possible in the same yard from its former position. Notice the effect. Almost instantly you will see a swarm, as it were, collecting around the place where this hive had stood, they are the workers returning from the field, their home is gone. They are confused and aimlessly fly about for a few seconds, and then alight at the entrance of the new hive where their mother is the queen then reigning; the bees have the same scent, they are received, deposit their load and go again to the field for more honey. Likewise, the workers that were in the old hive which we moved so carefully do not know their home has a new location; they go forth but return to the old location; they are received, and a rousing swarm is the result. No wonder the honey sections fill up quickly, there are so many workers. But what happens at the

old hive in its new location? Nearly all its working force has been drained away to the new swarm. In a day or two the new queen hatches; she has few bees to hamper her actions, she makes a tour of the hive and murders her sleeping sister queens yet unborn; she is monarch of all she surveys, and there is none her right to dispute. You will not be troubled with second swarms. No time has been lost since white honey began to flow, and now we have the whole working force concentrated on comparatively few sections. If there is any white honey we get it. After a week or two we can put sections on the old hive, and all our bees will be in shape for dark, or fall, honey.

THE HIVE I USE.

C. THEILMANN, THEILMANTON.

Much has been said and written about hives. Some beekeepers advocate small hives; others, large ones; some use shallow, double hives, and others high, narrow hives; and each claim that his hive is the best. It is no wonder that beginners get confused and hardly know what hive to adopt. I kept my first colony in a gum, or a part of a tree, my second in a store box and my third in a nail keg. The first one I found in the woods, in a tree; the other two were swarms which I found on some wild plum trees near my residence. Two of these three swarmed the same season, for which I made common boxes. This made me five colonies the first year of my beekeeping, without any outlay for bees and but little expense otherwise. I got some surplus honey from them, though I don't recollect just exactly how much—but the hives were all full of nice honey.

I never kept bees before and did not know anything about beekeeping, but learned enough during the season to know that gums, nail kegs and boxes were not the things to keep bees in and have any good from them; so I went and saw a number of other beekeepers, who were scattered around the country, and saw how they kept their bees.

I did not know of any bee papers then or books on bee culture. After a number of investigations, I saw a hive which, in my judgment, was best adapted to this latitude and climate, I ordered and filled with bees twenty-four of these hives the next season, including the five I transferred from their old homes to the new. This was in the summer of 1870. In 1871 I tried the regular Langstroth ten-frame hive for an experiment, also some other patents, but none of them suited me as well as the first ones I purchased. Since then I have adopted and kept it in use exclusively, to this day, and will do so hereafter unless I can be convinced of a better hive for Minnesota.

I am free to say that my success in beekeeping is partly due to this hive. The hive is called the Minnesota Langstroth. It has a portico and a cap over the supers, or section cases; the bottom board is nailed tight to the brood chamber, so it can be used as a feeder when needed, by tilting up the front three or four inches. This is the only perfect feeder I have ever tried. It is always emptied by the bees in a very short time, and a ton of honey or syrup can be

fed in this way in less than an hour by one man. The hive is seventeen and one-half by thirteen and one-fourth inches, and eleven inches deep; the frames rest on rabbits, and are fifteen and three-fourths by nine and three-fourth inches, inside measure. The upper, or top, bar is eighteen inches long, one-half inch thick and seven-eighths of an inch wide, with a tongue in the lower side to fasten foundation to it. The lower bar is seventeen and one-eighth inches long, stands edgewise in the sidebars, and projects a bee space outside of the sidebars. This projection is a most excellent contrivance in handling frames quickly; it prevents the crushing of bees in taking frames out and putting them back; neither can the bees stick the frames fast to the walls of the hive with propolis. There is a bee space all around the hive, also over the frame. I used nine frames the first season and eight frames after that. The capacity of the brood chamber is about the same as a Langstroth ten-frame hive.

My section case holds twenty-eight seven to the foot sections, has three partitions, and two-inch wide strips of glass in the sides, with wooden slides over the glass to see the advancement of sections without disturbing the bees. I have no use for separators; they are a hindrance to the bees.

I get straight combs by nearly full sheets of foundation and by setting my hives level from side to side, and keeping full of bees.

I do not paint my hives, on account that paint will hold the vapor of the bees in the hive, which nearly all, if not all of it, will escape through the pores of the wood if not painted. This is a great consideration, for the health and welfare of the bees, especially in winter. The lumber of my hives is planed on one side only, the inside; the outside is left rough, which prevents the reflection of the hot sun in summer months; it also prevents cracking and warping of the wood and, besides, is more durable. A more shallow hive may give more surplus honey, just for a season, but, for a long run of successful beekeeping, my hive has stood the test over all others in Minnesota when properly handled.

WHICH HIVE, EIGHT OR TEN FRAME?

W. I. STAHMANN, WEAVER.

This is a subject of much importance, and one that has been discussed a good deal, especially the past season. As I have used both sizes extensively for the past seven years, I will give my experience and let the beekeepers of this convention judge for themselves.

In the winter of 1886–87, I had sixty hives of bees in good condition. About twenty of them were in Langstroth hives, the dimensions of which are 11⅛ in. deep, 17½ in. long and 13½ in. wide, using nine frames 10¾ in. deep and 16¾ long. Forty colonies were in Simplicity hives; inside dimensions, 9½ in. deep, 18½ in. long and 14¼ in. wide, using 10 frames 9⅛ in. x 17⅝ in. I did not like either of these styles of hives, and as I was in need of more hives, I concluded to make a change.

About this time the question was asked in the question department of "Gleanings" "Which is the best size of hive, eight or ten frame?" The answers were nearly all in favor of eight frame hives, also most of the articles written in the journals favored eight frame hives. As I was about to change the style of hives, I also concluded to change the size. I made 150 eight frame hives, and put about seventy-five of them in use that season, also using my old style of hives. My average crop per colony that season was fifty lbs., spring count. I noticed they made less honey in the eight frame hive.

In 1888 I started an out apiary on the Zumbro river about five miles from my home apiary. This was a better location, more low lands and timber, while the home apiary was surrounded with grain farms. I put in use 100 of the eight frame hives this season and fifty of the larger size. The average crop was fifty lbs. per colony, the large hives producing about twenty per cent more honey than the eight frame, and the sections were filled and finished better.

In 1889 I used about 125 eight frame hives and seventy-five nine and ten frame hives. My average crop being about seventy-five lbs. per colony spring count, with thirty per cent in favor of the large hives.

In 1890 I moved to my present location, Weaver, Wabasha Co., in the Mississippi valley bottoms, about twenty-five miles southeast of my former location. That was a very poor season. My apiary on the Zumbro bottoms had to be fed until the first of July, and in the fall were in a starving condition. The home apiary was fed until the first of June and made twelve lbs. surplus per colony, the ten frame making twenty-five per cent the more.

In 1891 I used ninety of the ten frame and sixty-five of the eight frame, all in the home apiary, averaging thirteen pounds surplus per colony, with thirty per cent. in favor of the ten frame hives. In 1892 I had about the same number of hives, the crop averaging about the same. In 1893 I used thirty of the eight frame and thirty-five of the ten frame, an average crop of 100 pounds per colony—and this is the only season that the eight frame did as well as the ten-frame hive for me. The hive that gave me the largest yield this season was an eight frame hive, which was run with six supers the most of the season and made 200 pounds of comb honey, and no swarms.

In 1894 I used thirty eight frame and seventy-eight of the nine and ten frame, and raised an average crop of 175 pounds surplus per colony, spring count, the large hives making sixty per cent more honey than the eight frame, also filling and finishing the sections much better. A large number of the ten frame made over 300 pounds surplus, while the eight frame averaged less than 100 pounds.

In the above statements, the number of hives in use each season was the greatest number in use that season, while the average crop of surplus is based on spring count, or the smallest number in use that season.

When first I was about to use the eight frame hive, my theory was that of many other writers, that the eight frame was sufficient for

brood-rearing, and the two extra frames in the ten frame hive, which is generally filled with honey—I mean the two outside frames—would go in the sections instead; but I found that they put as much honey in the outside frames of the eight frame hive as they did in the ten frame, and instead of the brood crowding the honey up in the sections, the honey had crowded that much of the brood out of existence.

I find that the swarms from the eight frame hives are smaller than from the larger hives, so much so, that when a swarm gets out unseen, I can generally tell what size hive it came from by the size of the swarm.

Why should there be so much difference in the percentage of honey gained by the ten frame over the eight frame in different seasons? Some seasons bees will put more honey in the brood chamber in the early part of the season than others, and the greater the tendency to store honey in the brood chambers in the beginning of the season, the greater the difference.

In 1893 my bees stored less honey in the brood chambers in the early summer season than I have ever known them to do. The colony that stored 200 lbs of honey was run with four to six supers, holding twenty-eight sections, and kept all the frames solid full of brood most of the season; while in 1894 the tendency to store honey in the brood chamber was very great, especially in the eight frame hives.

I have noticed that bees in small hives do not seem to be satisfied. Their work in the sections compared with the work done in the ten fame hives gives me that impression. They do not fill the sections nearly as well, especially the end ones. I noticed this in particular in 1894. I had quite a number of the eight frame hives that would not finish the end sections. Four hives in particular that I could not make start in the end sections at all, but they *would* finish the center ones. Although I had more large hives than small ones, there was not a single large hive that troubled me in that way.

I find they winter just as well in the eight frame hive as in the ten, and I have had no trouble in having them run short of winter stores, as they don't seem to use as much as in the ten frame, but in the frames that are 10 ¾ in. they winter best when all are used with a ⅜ in bee-space below the frames. The past four seasons, I have reversed my bottom boards when putting bees in the cellar, it making a two in. space under the frames with an opening the full width of the hive, giving a free bottom ventilation and a chance for bees to cluster under the frames. With the bees prepared in this way, I find no difference in wintering in favor of deep frames.

Forestry.

MINNESOTA STATE FORESTRY ASSOCIATION.

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THE RELATION OF FORESTRY TO AGRICULTURE.

J. S. HARRIS, LA CRESCENT.

The subject of forestry in America is a problem that will not be put down. The interest in the subject is increasing every day, not only here, but throughout all North America; and the best and greatest minds of the country are giving the subject investigation, and bestowing upon it the thought and labor of their lives.

The first home of the human race was among the trees in the "Garden of Eden," and never since has there existed an ideal home without trees. They are welcome alike to the rich and poor, and just as indispensable for the protection they afford from the ice-laden blizzards of the north and the scorching, withering winds of the deserts of the south. The first homes of free and enlightened America were planted upon the Atlantic coast in a wooded country that for ages had been inhabited by barbarous tribes, who have always sought forests as their homes. The first work of our fathers was to destroy these forests, and the march of civilization westward has been marked with the most reckless slaughter of trees and robbery of the earth of her beauty. Trees planted by the hand of God are things of beauty, and a joyful heritage to them, that should have been handed down to their descendents.

Similar scenes have been enacted in all civilized countries, and never a halt called until the danger line was reached, and droughts, floods, pestilences, famines and other calamities warned the nations that they must go no farther. In our country the destruction has gone on with greater rapidity than in any other country of the known world. The effect that this is having upon the climate and soil, rainfall and drought, and how much it has to do with winter blizzards and summer tornadoes, will be fully discussed by others.

A few rambling remarks on the relation of forestry to horticulture, and principally upon that branch of it known as pomology. It is a well known fact that the best fruit regions of North America have always been, and still are, in the forested regions or in close proximity to large bodies of water. It is equally well known that some of the once best fruit regions have deteriorated greatly—where once it only required the planting of the trees and protecting them against stock until they got old enough to take care of themselves to secure bountiful and unfailing crops of fruit. This was the case in the New England states, New York, Pennsylvania and Ohio.

In those days nearly every tree planted lived, flourished and produced fruit. Things have greatly changed since. Instead of the bountiful crops of former years, now, in many places, a full crop is getting to be uncertain, and a light or poor crop the rule rather than the exception. In the early settlement of Ohio and other states named, the site for the orchard was virtually hewn out of the woods and the fruit trees planted there, and the failure of the apple crop, was so rare that for the first twenty years of my life I never heard of but one instance.

First, large areas of forests were only felled and cleared off to make room for fields for cultivation; but later, the timber began to have a

money value, and then commenced an indiscriminate slaughter and robbery of property to increase the wealth of the present generation. The needs of railroads and manufactures have stimulated the greed of man, and in a few years more, unless a change takes place, desolation and ruin will follow the path of the destroyers. The result shown already is, that many of the old orchards there are only producing leaves and blossoms and fail to mature fruit of any consequence, so that the crops are nearly always failures.

No doubt there is more than one cause for this effect, but the prime cause seems to be the excessive and injudicious demolition of the forests, giving, in their seasons, alternating cold and dry, hot winds an undisputed chance to sweep over the regions thus made barren. Sixty years ago the desirability of extra hardiness in any variety was hardly thought of; today extreme hardiness is one of the most desirable requisites of a tree.

Now, I do not intend or desire to make any argument out of this condition of things against growing orchards successfully in states possessing much less forests than the states mentioned have left at the present day. In many of these cases the orchards were planted first, and the barriers of protection against wind and storm removed afterward. I believe in forest barriers in certain localities and for certain purposes, but I do not believe that it is necessary that the major part of any country should be left in dense forests to make the pursuit of horticulture more successful. A judicious system of removing the original forests, leaving windbreaks and shelter belts where needed and locating the reserve timber lots where protection is most needed, and the disastrous results would have been obviated.

In this state there exists a very intimate relation between forestry and horticulture in all its branches—yes, and every other branch of agriculture. Whether we ever become one of the apple states and hold our reputation on the production of the small fruits, vegetables and grains, depends very much upon the system of forestry pursued.

This is very far from being a treeless region, but in very many respects we are so peculiarly situated that the forestry question is one of extraordinary moment. Beyond our northern border and extending, perhaps, a thousand miles northwesterly, to the region of perpetual winter, is a vast plain but lightly wooded and without mountain ranges to break or change the course of the winds that sweep down from the Arctic Circle. The winds that reach us from that direction are neither warm nor overcharged with moisture. On the west, over the Dakotas, there are no large bodies of water and comparatively very little timber, and, generally, when the west winds reach us they come with an insatiable thirst and drink up, instead of imparting, the moisture we so much need to succeed with horticulture. Again, to the southwest, over the country once known as the American desert, is a vast, almost sterile region, over which most damaging heat and blight-laden winds occasionally reach us.

On the north, nature has kindly done her part towards our protection in locating up towards the border quite extensive forests and a region of lakes, streams and swamps. Vandalism has already been

at work there, and the eye of unscrupulous greed is watching her chance to lay the barriers low, dry up the lakes and streams and for money convert this fair North Star state into a frozen desert waste, unfit for human habitation. It is our first duty to see that proper laws are enacted and enforced to preserve that forest area intact and prevent the lakes and swamps from drying up, and that course with the benefits that are bound to accrue to us through the work of our Canadian neighbors in starting groves and windbreaks to fit their own country for successful agriculture, will preserve to us the advantages we now have and in the near future help to move the line of orchards considerable farther northward.

On the west, every tree and shrub planted and luxurious growing crop is making the west winds less arid and is greatly to our favor; while the opening up of farms and planting of timber in Nebraska and Kansas are already showing its ameliorating effect upon our climate. What we now most need is not extensive forests but small groves and suitable shelter belts for orchards, gardens, buildings, the orchards themselves and the necessary ornamental trees and shrubbery to make the homes beautiful and attractive. To bring this about the most quickly, there is need of a better knowledge of the planting and care of forest trees, and some careful forethought about the places where to plant them to secure the greatest benefits and give the most protection.

It is an established fact that orchard trees planted in the proper relation to a windbreak, either natural or artificial, make a thriftier growth and stand more upright.

1. The windbreak of timber to a certain extent prevents the snows of winter from drifting or being blown away, and also saves the fallen foliage upon the ground where most needed, and at the same time prevents the soil from being so deeply frozen, and, consequently, there is less danger of injury to the roots.

2. The leaf mulch and shade from the timber tend to keep the surface soil from becoming compact, and more of the water from heavy showers sinks into the ground, penetrates deeper and dries out more slowly.

3. There being more snow on the ground to melt in the spring, the soil absorbs more moisture.

4. The buds of trees are less liable to be winter-killed or injured in extreme weather when properly sheltered, and the trees on the favorable side of a grove or belt will frequently blossom full when those upon the opposite side are killed.

5. A windbreak upon the north and west side of the orchard and garden saves a crop of fruit by sheltering from the northwest winds that often occur when the trees and plants are in bloom and from later colder snaps that often cause the greater part of the crop to blight and drop before half grown.

6. Windbreaks very often save heavily laden trees from being broken down or uprooted, or the fruit from being blown off in heavy wind storms. They tend to make orchards more uniform in bearing. We have frequently seen unprotected orchards barren of fruit, when those well protected were bearing heavily.

Timber belts and windbreaks are equally beneficial to the growing of small fruits, and in many places they cannot be successfully grown without some protection of that nature. The best grapes are always nearest to the shelter on the north and northwest. Currants, raspberries, strawberries and blackberries are always better for protection on the south and west, and need much less extra winter covering when thus protected and for the very reasons heretofore mentioned, viz., that windbreaks protect from cold, retain snow in winter and retard evaporation of moisture in summer. In many localities in this state it would be about out of the question to raise strawberries without the protection of a timber belt or hedge.

Also, the kitchen garden is greatly benefited by surrounding it with a timber windbreak. The soil becomes warmed up and in condition to plant earlier, most varieties will generally mature earlier, and the yield will be larger and the quality better.

There are some horticulturists who hold to opinions directly opposite to mine, at least so far as orcharding is concerned. I have no reason to question their honesty and will admit that I have seen injuries result from forest protection, but it can almost always be traced to an improper relation of the two. The proper relation between the two varies greatly with the shape, aspect and surroundings of the adjacent country. If the country is nearly level, it is my opinion that a windbreak upon the west side of the orchard or fruit garden is always beneficial, also on the southwest and northwest; with ground sloping to the south and higher elevations adjoining or near by on the north, the windbreaks should be upon the south and southwest sides and omitted on the north, except for grapes, strawberries and vegetables.

In ground sloping to the north and northeast—which is generally recommended—the windbreaks should be on the north and northwest sides, and, if practicable, the north belt should be upon ground somewhat higher than the lowest part of the orchard. In all cases it would be better if there could be a strip of ground between the orchard and the shelter provided that is a little lower than that upon which either of them stand. No greater depression than can be made by two or three plowings of the ground, finishing in the same dead furrow, will answer a very good purpose. Windbreaks upon the south side of an orchard may safely stand nearer than upon other sides, but in no case should the windbreak and orchard be so near together that the roots of the trees comprising them will eventually run together and rob the soil of the nutriment and moisture needed for the well being of each other.

The inner line of the break on the north side of an orchard should be at least fifteen feet inside of the next line and far enough from the fruit trees to prevent reflected heat reaching back to them, and the trees in this line are better if not standing too close together.

For the orchard alone I think a broad and rather open break of evergreens and deciduous trees mixed would prove the best; for most other purposes close planting of evergreens is probably the best.

FOREST FIRES.

H. B. AYERS, CARLTON.

Why the forestry question should be of interest to horticulturists may be a matter of wonder to some, as it once was with me, but we learn that their study of growing plants has enabled them to see in the forest things that the lumbermen have not seen, and this insight into the lives of the friendly trees has taught them, in their endeavor to clothe the prairie with productive crops, the use of trees. In common with other people, too, horticulturists acknowledge, I believe, some love of country and some regard for the future of the land that has nourished them.

It is not so strange then, after all, that the farmers and gardeners, who have a permanent interest in their communities and in the state, should take an interest in and demand a better care of the forest, that, covering our highlands, precipitates the atmospheric moisture from the northeast and fills our hundred thousand natural reservoirs on the hills above us, from which are distributed through sandy strata a constant supply of pure water to the hundred thousand streams that have their sources on the lower slopes of the highlands.

But this is not the only way the forests bring water to us. Contrary to the pernicious theories propagated by some business men for business purposes, forests are not altogether dependent upon uncontrollable, climatic conditions for their existence; but many functions of the forest, especially its generous outpouring of moisture and temperate air, tend to form conditions favorable to its own growth and the growth of other plants beyond its borders. This principle is recognized by the most intelligent farmers and gardeners as well as by tree growers and foresters.

Together, then, let us move to aid our much-abused forest in its strife with the prairie, even hoping that it may at last extend its moisture over all our state and neutralize the parching blight of our southwest winds (which last year were felt well toward the headwaters of the Mississippi); that it may roll them back and enlarge the bounds of our fertile and beautiful park region, until it may include even Martin county and continue on to give relief to the people of Nebraska and Kansas.

While the Forestry Association has been busily cultivating a proper view of what should be done on the prairie and distributing information and trees for planting, our original forest has been and is being ravaged by and abandoned to fire.

To discuss the reason for this destruction will perhaps satisfy us of unwise policies in the disposition of the public lands, of fraudulent claims accepted, of dishonorable practices in stripping and abandoning lands, of connivances and sharp practices that many lumbermen smile at, of outright and traitorous thievery, of erroneous theories propagated for selfish purposes, of reports of wrong doing ignored by officials, of silence by those who should have made wrongs known, of investigations that show conclusively that the lands with which our institutions have been endowed are being sys-

tematically robbed, of reform that is plainly needed in this line, and not only reform but intelligent, systematic management, which, I trust, this association will take active and vigorous measures to secure.

The whole broad subject needs immediate attention. But I must confine myself to the special subject of this paper which is:

THE PREVENTION OF FOREST FIRES.

What is the use of all this talk about forestry and the prevention of fire? What does it amount to? It is all very nice to have some subject that sounds well, that sounds patriotic, but what good does it do?

Such ideas, if not spoken, seem to have been implied by the attitude of too many people towards the Forestry Association and towards the forestry work; but we are glad to say this quizzical and indifferent attitude cannot now be assumed without downright ignorance and culpable inattention to the needs of the day.

The time has passed for doubting whether forests are beneficial and should be preserved and propagated.

Even the quieting remarks made at our meeting a year ago are far behind the times today, for, sitting in the ashes of our recent fires, the people are crying: "The calamity howlers were right, but they did not tell us half of what was going to happen. We are now ready for the plain facts. Can't you help us?"

May we not then at once discuss these questions?

First—Should our forests be protected from fire?

Second—Can it be done?

Third—If it can be done, how?

Our forest furnishes employment to 20,000 men cutting pine and perhaps a third more cutting fuel, ties, piles, poles, posts, barrel stock and hardwood. Is it desirable to perpetuate this great industry and not only produce enough material to supply our own wants, but to bring money from other states and other nations by shipping our surplus to them as we do now? There can be only one answer to this question. But what has this to do with fires? Simply this: The forest cannot be preserved unless the fires are stopped, and if the fires be stopped the timber will grow again. Some deny the latter part of this statement, and say after the virgin pine is cut, pine will never come in again, and the forest is worthless. This is too true under the present liability to fire, but utterly and perniciously false if the fires be prevented. Even men of intelligence and prominence in the lumber business have said: "Why prevent fire? Pine will never come in again after the marketable timber is once cut." This assertion needs the strongest possible denial. The men that make such an assertion deserve ridicule, and I will say they must have had sawlogs in their eyes when they traveled through the woods. This is not altogether a joke; they were looking for sawlogs and could not have looked at much else; for loggers in cutting often leave a hundred thrifty and vigorous young pines from four to ten inches in diameter, and from twenty to a hundred feet high on an acre after the log timber is cut, and on pine stump land that has escaped fire three years, thousands of little pine seedlings may be seen springing up.

In order to be able to refute such mistatments utterly, I have here minutes of the exact location where young pines in excellent condition for timber grown may be seen, and right by may be seen burnt land cut the same year that could not be put in a condition as promising for timber for less than twenty dollars an acre. In fact, so favorable a soil, mulch and shade can hardly be made at once on that burnt land for any price. Several such acres on 16—56—22 were staked off and the trees counted; on one from which 32 million ft. had been cut three years before, were thirty-two thrifty sapling white pine, 8 to 11 inches in diameter and 30 to 80 feet high; ten poplar 8 to 14 inches in diameter and 60 feet high; 1,600 poplar sprouts ½ to 1 inch in diameter and 5 to 12 feet high; a light underbrush of hazel and vine maple; and under all this were 1,267 little white pine seedlings two years old and 4 to 8 inches high. Another acre on the same section has 200 trees of white and Norway pine averaging 8 inches in diameter and 45 feet high. Are not these worth saving? Many thousand acres of just such trees have been burned on land that is not in demand for farming at any price. Should such trees be saved? No one dare say not.

On account of the fires and conditions unfavorable to tillage, much of such land has no market value. Just what it would have if safe from fire is a subject that should have careful study.

The fires also damage property having a present market value, such as standing and other log-timber, camps, camp equipage and live stock, mills located in the woods and lumber, besides the homes and lives of our fellow men. Excepting the latter, there is no loss that compares with the prevention of the future growth of the forest with its products and its beneficent influences. There may be many who have some doubts as to what the favorable influences of the forest are. Here are a few that are reasonably certain:

1. Aiding the damp northeast winds in their conflict with the parching winds from the southwest.
2. Preventing deep freezing of the soil.
3. Catching snow by checking the wind during blizzards.
4. Holding snow in spring by their shade.
5. Preventing erosion of the soil.
6. Giving out moisture into the air.
7. By their moisture, their coolness and their resistance to winds, promoting rain fall.
8. By promoting fogs, often preventing frosts.
9. Protecting against the cold winds of winter and the hot winds of summer.
10. Promoting health by purifying the air and the water. (Here let me say that in the regions burned last season we already have premonitions of fevers, and there are many cases of sickening by the use of water leached through ashes and deprived of shade and growing plants).
11. Regulating water flow. (If the rains next spring be as heavy as last, we may note a much higher stage of water; for the large denuded areas will shed their waters quickly).

In short, the good influences of the forest are many, and together they are cumulative. It is not within the province of this paper to enlarge upon them; they have been discussed time and again and nearly always with the same conclusion. The nations of Europe have long ago taken effective action. Our federal government and the Eastern states are regretting they did not do something before the land was patented to individuals.

Pardon me if I repeat that one of the first things to be done for the preservation of the forest is to stop the fires. Our present liability to fire absolutely prevents any hopes of successful forestry. After cutting, a forest will quickly grow again; after fire, it will not. Certainly these fires should be stopped and at once.

Can they be? is the next question.

The fire as it raged at Hinckley could not; but each of the hundreds of little fires that contributed to it could have been. Prevention, rather than cure, should be sought, and as fires always have a small beginning and are in every instance caused by man, they can, with very few exceptions indeed, be kept within control. According to Dr. Fernow's report for the year 1893, the forest fires in Prussia during the exceptionally dry year of 1892 ran over only 6-100 of one per cent of the Prussian forest area. There they protect against fires.

We should have statistics of the areas burned over in Minnesota during the past season. Lacking such, we must use what rough estimates we can get. I am told by a man who has been through the region, that within the triangle between Staples, Grantsburg and Duluth 90 per cent of the land was burned over. My own observation covers roughly the country between the Mississippi and the St. Louis rivers and the Prairie river basin above Grand Rapids. I think 75 per cent of that land has been burned over; and from what can be learned of other parts of the forest, probably 40 per cent of the whole wooded portion of Minnesota was burned over last year. If we assume this 40 per cent, or 1 in 2½ acres, as approximately correct, and compare this percentage as the result of no systematic protection in Minnesota with the 6-100 of one per cent, or 1 in 10,000 acres, burned over in Prussia, where there is protection, during one of the driest years, are we not assured that something can be done?

Others have prevented fires, cannot we? Will the people of Minnesota, pioneers nearly every one, and with a record to be proud of in every other work, lag so far behind in this? I think not if they will only give their attention to it. It seems to me it all hinges on this point—attention, for if this subject be studied as it should, every one will feel it his duty to stop the fires.

How can this be done?

Let me give my experience of last summer: Passing land of a friend and seeing that fires were burning on it, I stopped to put them out. Five or more had been started wilfully; one had gone out, but four were burning vigorously, both eating into the turf and running over the surface. With mattock and shovel the fire was put out within a week, digging shallow ditches through the dry turf at the

rate of twenty rods a day. Fires can be put out even after they have gained considerable headway; but the easiest and best way to stop fire is to prevent it starting; and to prevent them all, all the people who start them must be reached and influenced. How to reach them might be left to the managers of such an undertaking; but a few suggestions briefly can be made here.

Every individual should have some influence brought to bear upon him that will prevent him letting fire get beyond his control, whether he be locomotive engineer or trackman, farmer or tramp, lumberman or timber thief, sportsman or pot hunter, white man or red. The aim must be to prevent wild fires entirely. Legislation is talked of and is necessary; but it should be remembered that legislation can at best only support a movement. Penalties are not enforced unless the people enforce them. Officers cannot be everywhere, and officers may fail to do their duty unless the people urge them on. There must be a strong popular sentiment in favor of the work. You ask how can this sentiment be created? My answer may surprise you, but I think I can say it safely—we have this sentiment already.

The friends of the forest might be congratulated on this, but for the fearful price we paid for it.

Yes, I believe every one interested in the woods is anxious that something be done to make life and property there more safe, but they have different ideas of what should be done. If we could only select those measures on which all agree, we would not be far from right if all were well informed on the subject.

The greatest difficulty, perhaps, lies in the fact that often the restriction men would like to have placed on their neighbors is what they do not like to have tried upon themselves. It is too often irksome, when living miles away from neighbors and no one there to see us, to make any sacrifice for the public good. Settlers clearing land want to set fire when and where they please. Hunters and other campers want to build fires where they will be most convenient. Children, some of them gray-headed, like to start a fire wherever it will make a big blaze. Railroad companies do not like the expense of careful guarding, and locomotive firemen (it is hard to blame the poor fellows) like to have a good strong draft and are tempted to take out screens and traps. Section foremen have so few men to help them that they cannot keep the right of way clear and have not time to watch the piles of rubbish they burn and see that no fire escapes.

Considering all the sources of fire, it is evident that there is much ignorance and there are many errors of judgment as to when a fire is liable to spread. There is also much wilful and deliberate setting of fire when it is intended to spread.

The work of prevention will have to be done by those who have intelligence and love of country and who see friends in the trees that are devoting their lives to the service of men. The ignorant must be kindly instructed, the vicious must be compelled to use caution.

PRACTICAL ACTION.

But how can every one be reached? Let us not say it is impossible! That is the lazy man's doctrine and is entirely unworthy of Minnesota people. It can be done, *and done well*, if every one will do his duty. There are now lines of communication established to every family and every individual through the store and the post office. Use these. There are now established, supervisors of all organized townships. Use these. There are now established schools for the instruction of every child, who may in turn instruct every family. Use these. There are now established constables and other police officers. Use these. There are now officers of justice in every township. Use these.

Will the present organization be effective, and can this be added to their duties and without increase of salary? Try it and see. But from what source shall emanate the instruction and discipline necessary, or, rather, who will represent the people in this function? Every efficient system must have a head. A man specially qualified for the position should have control of it, and he should have ample means to carry out his plans. He should not be obliged to work at anything else, for it will require all the time and all the energy of the best man that can be found. He should be empowered to employ counsel and assistance, especially to collect and distribute information; and he should be thoroughly supported by necessary legislation.

To begin at once to establish every known valuable feature of forestry would be very imprudent and would involve much needless expense. On the other hand, a miserly policy would be quite as bad, for the expense would be even greater through loss of the forest. Let everything be done consistently, with a reason for every act, a sound footing for every step, and above all, with a love for "Our Minnie," her people and her trees.

This last clause is sentimental, but sentiment is just what we need. If there had been the proper sentiment on this question forty years ago, our forest resources would have been safe. But now as we pass among the charred remains of the grand old forest that once stood as a guaranty of our prosperity, those prophetic words of Scott applied to Marmion are suggested:

"Where shall the traitor rest?
He, the deceiver,
Who could win woman's breast,
Ruin, and leave her?"

It is the duty of those who have been enriched by harvesting foreign timber to at least leave the forests not wanted immediately for farming in fair condition to produce a new crop, and not leave them as they do now, blighted and worthless.

RAINFALL IN MINNESOTA.

EDWARD A. BEALS.

U. S. Signal Service Station, Minneapolis.

If we could obtain during the growing season the proper distribution of the meterological elements of temperature, sunshine and rainfall, agricultural pursuits would become an exact science, and it would soon be possible for us to determine at the time of planting, almost to the bushel, what yield would accrue from each cultivated acre.

All of these elements can to some extent be controlled artificially: that of temperature being accomplished in greenhouses through methods familiar to all; that of sunshine by the electric light, provided its rays are filtered through glass; and that of rainfall by means of irrigation, which is a comparatively cheap, practical and efficient substitute for its deficiency, whether habitual or otherwise.

The control of temperature and sunshine presents difficulties that render impracticable their application to extended areas; but in Minnesota this is of no particular consequence, as nature seldom fails to provide the right proportion of each for maturing those plants which are of the greatest importance to mankind. In the case of the remaining element, that of rainfall, we are not so fortunate; although the amount annually received is rarely insufficient, still severe drouths, doing great damage, are altogether too common, being largely caused by variability in its distribution.

We should not feel, however, that these occasional dry spells were due in any way to a righteous discrimination, as there is no region in the United States absolutely free from them, even including those places where the annual rainfall is in excess of one hundred inches.

The introduction by man of water upon land has, besides a minor use as a protection against frost, three distinct objects in view, one of which is the making of tillable land out of barren land through the sedimentary deposits thus obtained; a second purpose is the acquisition by precipitation of fertilizing materials held in solution; while the third and more general use is the making up of either permanent or temporary deficiencies in rainfall. It is probable that for many years to come the only necessity for irrigation in Minnesota will be for emergency uses during dry spells, and therefore it should properly be first introduced on a small scale in connection with horticulture and gardens.

Not the least of the conditions to be considered before its successful application can be accomplished is the drainage area available, the proportion of storable to percolating and evaporating water and the rainfall.

Local evaporation is occasionally the source of rainfall, but in Minnesota the vapor-laden winds from the Gulf of Mexico, the Atlantic Ocean and the Great Lakes, perhaps also including those from Hudson Bay and the Arctic Ocean, largely preponderate in supplying us with the moisture received. These reservoirs are inexhaustible, and no fears need be entertained regarding their per-

manency, even if the rainfall is, according to familiar belief, gradually decreasing.

As the question of rainfall stability has a very important bearing upon the matter in hand, it is perhaps well to throw what light we can upon this point before proceeding farther.

The best authorities now agree that the presence of extensive forests tends to slightly increase the precipitation, and, on the other hand, deforestation to correspondingly lessen it. Our lands are being rapidly denuded of timber, and it seems as if this had been carried on sufficiently to measurably affect the rainfall, provided any loss from this cause was ever to become appreciable.

The longest rainfall record within the state is that taken at Fort Snelling, beginning in 1836 and continuing with but few interruptions until 1892. By means of a St. Paul record kept only a few miles distant, the missing intervals have been very closely approximated and the observations made continuous for a period of fifty-seven years.

I have carefully examined this and found it impossible to detect the slightest permanent diminution in annual amounts. A further proof of past rainfall constancy, during thousands of years, is daily seen in the character of the soil, which in arid regions is predominantly sandy and silty, whereas loamy soils, containing considerable clay and known as heavy, have resulted as a rule from an abundance of rainfall. It will be found that nothing which man can do will ever increase or diminish, except in a very slight degree, our annual supply; but the evil effects of drouth will continue to be felt with increasing severity owing to deforestation and improper cultivation, the latter causing an accelerated waste in moisture by evaporation, nearly all of which is carried to distant lands before again reaching the earth's surface.

According to the latest rainfall charts, our annual supply varies between thirty-two inches along the western shore of Lake Superior and nineteen and one-tenth inches at St. Vincent, in Kittson county. There is, generally speaking, a uniformly gradual decrease in amount from east to west.

Captain Wheeler, in his report upon the United States geographical surveys west of the 100th meridian, says, "Farming without irrigation may doubtless be safely carried on when the rainfall exceeds twenty inches." If we are to accept twenty inches as the line of demarkation below which irrigation only is requisite, I need go no farther, as this state contains but a few square miles of such territory, and the question would then become one of little interest to us. The better way, however, is to treat the matter as is done in India, where millions of dollars have been expended by the government in constructing a system of irrigation which is available in districts where the annual rainfall is forty inches or over, although not expected to be put to practical use oftener than once in three or four years.

Some crops and small fruits can not be successfully raised unless abundantly watered, and a season could hardly pass without the cereals being at times benefited by moisture; therefore, until irri-

gation is introduced, many valuable resources will not only lie dormant, but our present yields remain far below what they might be.

Usually irrigation implies that the gain in crop production is accomplished through the application to a lesser area of the scanty rainfall collected from a greater one; but in Minnesota, with its abundance of natural surface and subterranean reservoirs, it is quite probable that no section need ever be depleted to supply elsewhere, even if the inflow to our lakes and rivers was thereby diminished and the active area of evaporation correspondingly increased, as will very likely be the case.

The monthly distribution of rainfall is quite an important factor which should also be taken into consideration. In the Atlantic and Gulf states, the fall during one month averages about the same as another, while on the Pacific coast nearly the entire annual supply is received between October and April, with June, July and August comparatively rainless. In Minnesota our wettest months are during the growing season, from April to September inclusive, with an average deposit of between seventy and seventy-five per cent of the yearly amount.

Heavy rains in winter are harmful rather than otherwise, as they leach out fertilizing ingredients from the soil and are of no benefit to crops, the seed of which has not yet been sown; therefore, if our normal spring and summer supply could always be depended upon, no better plan of moisture distribution could be devised, as it is a natural system of irrigation in itself, which would not require any artificial annex.

The average rainfall during the growing season in Minnesota is approximately twenty inches and is equal to that received in other Northern states to the east, except along the immediate coast; therefore, when applied to crop production, our yearly rainfall should be increased one-half, if comparisons are made with those states receiving their annual supply in equal monthly installments. This all goes to show that if the employment of irrigation is needed here, its introduction is of like importance to a number of Eastern states receiving an annual rainfall one-half greater than ours.

The question of annual rainfall resolves itself into still another phase of variability besides that of monthly distribution before we can rightly judge its full meaning.

A yearly fall of thirty inches may also mean a fall of forty inches for several years, followed by years of twenty inches or less, and such is unfortunately the case here. Our annual deviation averages about fourteen per cent of the normal, which means that in those places having a yearly rainfall of twenty-five inches it is quite likely the actual quantity received during any one year will be 3½ inches greater or less than that amount. It is also rather a singular fact that during a long period there will be more years with less than the normal rainfall than years with a greater amount, which shows that, as a rule, the departures are greater in wet than in dry years.

Districts having the smallest variability in annual rainfall are least subjected to prolonged drouths, and we will now see how Minne-

sota compares with other sections in this respect. Along the Gulf and Atlantic coast, from New Orleans to New York, this percentage is lowest, being only eight or nine. As we go toward the interior it increases to twenty per cent at Omaha, and then going north it diminishes to fourteen per cent in Minnesota. On the Pacific coast it is least at Portland, being thirteen per cent, then gradually increases to the south until San Diego is reached, with the large mean annual deviation of thirty-seven per cent.

With over forty inches of rainfall, irrigation would rarely be of much benefit, except as a means of fertilizing the soil. The cloudiness in these districts is usually sufficient to prevent excessive evaporation, which is really more of a factor in causing a drouth than lack of rainfall

In districts having less than forty inches, it is only a matter of time before irrigation will become universal, and that force at work more than any other to compel its application is the steady increase in population.

It has been pretty well proven that, unless overtaken by some terrible catastrophe, the world's inhabitants will so increase in the comparative near future as to render the obtaining of sufficient subsistence impossible, and in China and India, where this increase is now most marked, a moderate drought, reducing but slightly the yields, causes a dreadful famine and great distress throughout the region affected.

We here in Minnesota are now at that stage where the inevitable can be foreseen, but on account of the many complications involved, including the necessity for new laws and great engineering ability, no general plan of adoption is likely to be put in practice for some time to come; and its necessity is not so very urgent, either, as farmers do make a living as it is, and, while waiting for the new era of smaller farms and larger yields, a valuable lesson is being learned in conserving the moisture already available through improved methods of cultivation.

RELATION OF WATER TO PLANTS.

(Prof. B. T. Galloway in an article entitled "Water as a Factor in the Growth of Plants." summarizes as follows, and in this is found the gist of the whole valuable article. It is worthy of careful study. Secy.)

SUMMARY.

The facts presented show—

(1) That water makes up the largest proportion of the weight of green plants, indicating at once its great importance.

(2) That water, with the food which it contains, is obtained by plants exclusively through the roots, and therefore a well-developed root system is essential to the best development of the plant.

(3) That the development of root system may be controlled in various ways, thereby increasing or decreasing their ability to absorb water and food from the soil.

(4) That a saturated soil is detrimental to the growth of roots; a

soil about half saturated is most favorable to their growth and therefore favorable to the growth of the whole plant.

(5) That growth is dependent on the turgidity of the cells, and turgidity is dependent on the absorption of water by the roots.

(6) That the water absorbed by roots is continually being lost by evaporation from the leaves. If the loss is equal to or greater than the absorption, the plants will cease growing, and unless the absorption is increased or the evaporation decreased the plants will die.

(7) That evaporation may be controlled by increasing the amount of moisture in the air, by protection from hot winds, and by the use of certain substances in the soil or on the leaves to enable the plant to hold on to the water that it has.

Finally, then, an accurate knowledge of the relation of water to the growth of plants will enable us to control more fully the development of the plant as a whole, and also the relative growth of its parts. It will show us how to modify the growth of the plants, that they may be able most successfully to withstand adverse conditions and produce the most valuable substance for a given amount of labor.

CRANBERRY CULTURE.

(Prepared for the "Northwest Horticulturist," Tacoma, Wash., by James Webber.)

HOW TO SELECT A BOG.

The bog should be in a location well protected from frost, with a bottom of peat, mud or moss, or it may be of the substance known in this section as muck-soil. Cranberries will grow well on either foundation. There should be sufficient inclination to the bog to afford fall enough to allow the water to be drained off to eighteen inches below the surface. If there is not a brook running through the bog, there should be a spring or a pond above it, capable of affording a sufficient supply of water to flow it readily. If there is water enough to cover the vines completely, it is all that is needed. The bog, after it is three years old, ought to be flowed (or kept moist) from the first of November until the first of June, as it is then thoroughly vined, and a crop may be expected. There should be a sufficient supply of coarse sand suitable for covering it, near the bog.

A huckleberry, maple or cedar swamp is preferable to the fresh meadow, for the reason that it costs less to take care of it after planting. Trees should not be allowed to grow near enough to the bog to shade it, because it will result in producing rank vines and but little fruit.

Notwithstanding the fact that most successful bogs, as a rule, are those located where they can be readily flowed and thus protected from the ravages of insects and injury by frost, yet there are some notable exceptions to the rule. There are dry bogs under cultivation in one of the Eastern states comprising hundreds of acres that have produced well for years, escaping both frost and the fire worm.

CLEARING AND TURFING.

Brush or wooded lands should be thoroughly and well cleaned, having all small roots removed near the surface. Care should be observed during the dry seasons that bogs which might burn are not set on fire, or their fertility will largely be destroyed. The surface of the bog, after the trees and underbrush have been disposed of, is next cut into segments of about eighteen inches square, by means of an instrument called a tufting ax, made especially for this purpose. It consists of a thin, steel blade, hatchet-shaped and about six inches square. This blade is made fast to a stout hickory handle, some two feet and a half long in the same manner as a common wood ax.

In expert hands this ax does wonderful execution upon the tough interlacing roots, with which the surface of the bog is generally filled. The method of cutting the turf is this: One man cuts across the bog from side to side in parallel lines a foot and a half apart and cuts across between the lines at like distances. Two men, with three or four: pronged iron tooth rakes, catch hold of the turf as the cutter goes along and pull it over after him. After being cut in these squares, it is desirable that the turf should be turned over very regularly, because the more evenly it is turned over the easier will be the work of grading. No overseer who understands his business will allow this part of the work to be slighted. The rakes are much the same as those used in hauling out muck, and may be found at the hardware stores.

DITCHING AND DRAINING.

There should be a main ditch, about four feet wide, as near the center of the bog as possible. When the bog is excessively wet other ditches should be run at a distance of five rods apart. When it is comparatively dry, and there are not many springs, the ditches may be from eight to ten rods apart.

Wherever springs are found, ditches should be made leading from them, otherwise they are sure to burst forth and cause more trouble afterwards.

There should be a marginal ditch running completely around the bog, about three feet wide at the top, eighteen inches deep and eighteen inches wide at the bottom. All the ditches must be dug with slanting banks to prevent the sides from caving. From the marginal ditch, the other ditches are all made to pitch toward the main or central ditch. It will be found necessary to clear the ditches often. Sometimes, if the bog is of good, firm material, they will not need it for ten years; but if the bog is soft and porous, the ditches must be cleaned yearly for several years until the bog becomes firm. A bog well ditched and well drained is less expensive to take care of than one which is very wet; for less weeds and wild stuff will spring up in it.

GRADING AND LEVELING.

A bog should be graded and made as smooth as possible, in fact, as near a "water level" as it can be made—because if it is of a good, even grade, it will take less water to flood it, and if the supply of wa-

ter is limited, it is of course essential that this particular should be closely attended to. If there is a great deal of brake or other kinds of fern or other wild stuff which is hard to kill, and the bog is high enough to stand it, having a fall of from three to six feet, then it will be well to turf the whole of it and have the top removed to the most convenient place and burn it on the spot. This course will save a great deal of labor and extra expense in weeding.

The grading should be done as well as if laying down a lawn or pleasure ground to grass, the object being to get an even coat of sand over the whole of the surface of the peat or muck. If the sand should be put on unevenly so that in places there would be seven inches instead of four, the desired thickness, the vines would make a very uneven growth. Plants set where the sand is deepest would be a year or two longer in making a growth through such a coating than would those planted where they could readily strike their roots down into the rich muck beneath.

SANDING AND PLANTING.

The sand should be of a gravelly nature, free from clay or loam and considerably coarser than that commonly used in making mortar for plastering.

Sand of this description can not always be obtained; but, whether finer or coarser, nothing which has an admixture of loam or clay should ever be used upon a bog, for the following reasons: It will bake down hard and the vines will not grow so vigorously as they will in loose porous sand; again, the water will not leach through very readily, and weeds and wild grasses will grow much quicker than where the surface allows the water to pass through it quickly.

After the bog has been leveled, as described, an even coat of sand four inches in depth should be spread over the surface. It is a great advantage to have the sand in close proximity to the bog, as it saves the expense of carting. In spreading the sand, it is usual to lay down some two-inch plank eight inches wide, for a walk, and the sand is brought on in wheel-barrows.

The planks are laid from sand pit on outside edge of bog to center and removed as fast as the bog is sanded. The sand is spread by means of a "spreader," made of a piece of one-inch white oak (or fir) board about fifteen inches long by three inches wide and fastened to a handle.

MARKING FOR THE ROWS.

The marker can be made of a piece of two-by-four inch joist, about nine feet long, having teeth set eighteen inches apart and a handle the length of a rake handle. The teeth are eight inches long, made of strong hard wood, driven through holes made in the joist for that purpose. The implement is made similar to the common rake, with teeth farther apart, and the whole made stronger to stand harder usage.

To mark off a bog, a line is stretched, say six inches from the margin of any one of the intersecting ditches as a starting point; run the marker lengthwise of that line, and continue to mark to within six inches, or the same distance of the next intersecting ditch,

and so continue back and forth between the shore and central ditch until that particular section has been gone over, and so on with other sections. When finished in one direction, the marker is then drawn transversely across the first markings over the entire sections, making the bog look much like a checker-board.

THE PLANTS AND PLANTING.

The cuttings used for planting are usually called "up-rights," being the shoots of the running, or main, stems of established vines, from two to four inches long, which bear the fruit. Sometimes long cuttings, about two feet in length, are used, being doubled at the time of planting. The uprights are mowed off of an established bog, using a butchering knife. They are cut off smooth from the runners and rolled back in windrows, as one would roll back a fleece in shearing a sheep. The average quantity of uprights required for planting an acre is four barrels, but with older cuttings it would take more, as with age the vines become larger and heavier. When a vine is eight or ten years old it is about the size of a lead pencil—but when young it is about the size of the lead in the pencil. Cuttings should be kept moist, in the shade or under fresh flowing water until planted. Planting is done with the aid of an implement called the "setting stick." It is about eight inches long, with a rounded and bulbous handle about a fourth of an inch thick, made of hard wood.

The little bunch of cuttings, or "uprights," is placed upon the sand, the blade of the "setting stick" pressed upon them, and with a single thrust of the hand the hole is made and the uprights set or planted at a suitable depth and in a proper position, that is, through the covering of sand and in contact with the muck beneath.

In this case, the vines being good, not one in five hundred should be lost. The cuttings, when set, should not project above the surface more than from one to two inches. When the long runner, doubled, is used instead of the little bunch of vines, if two feet long the runner is doubled twice, and then is planted with the setting stick precisely as uprights, as before described. About four uprights in a bunch are set in each corner intersection of the cross marks. If more are planted, they are apt to heat and not take root.

After planting, the bog should be kept moderately wet for two or three weeks by shutting down the ditch-dam and keeping the water back in the ditches to within eight inches of the surface of the bog until the vines show some sign of growing; then the water may be removed and the plants receive the benefit of any existing sunshine. In wet seasons, the water should be kept low.

VARIETIES OF THE CRANBERRY.

One of the most desirable varieties to plant is the "Early Black." It is very prolific and a sure bearer, and the vines are not such rank growers as most other varieties. Another good variety is the "Second Early" which ripens about ten days after the Early Black. There are other varieties of larger berries, but they do not keep so well.

Some desirable characteristics of the cranberry are outlined in the proceedings of the twenty-fifth annual meeting of American Cranberry Growers' Association, held in New Jersey in January, 1895, by Rev. E. H. Durell. The primary features are productiveness and soundness. Cranberries should be prolific and uniform bearers. They should be free from rot while on the vines and long keepers after harvest.

Secondly—the size, color, luster, shape, development of vines and culinary qualities. The fruit should be medium and even in size, deep and uniform in color; a clean, smooth, pure, bright luster; approximating roundness in shape; vines should have a strong upright, grow rapidly, mature early and not swamp too much. Fruit should cook quickly and tender and have the best flavor.

YIELDS AND PRICES.

Fifty barrels of cranberries per acre is a fair yield, but over one hundred barrels have been picked from an acre. The cost of picking the berries is estimated at from one dollar and sixty cents to two dollars per barrel of thirty-two quarts. The cost of screening is about twenty-five cents per barrel.

NOTICE TO MINNESOTA BEE-KEEPERS.

HASTINGS, Minn., Nov. 9, 1895.

Notice is hereby given that the 7th annual meeting of the Minnesota Beekeepers' Association will be held at Minneapolis on Thursday and Friday, Dec. 5 and 6, 1895. I would like to have every beekeeper who reads this notice to write me and suggest such questions as they would like to have discussed. Programs will be sent out as soon as possible. This will be the most important meeting ever held by the association, and it is very necessary that every member should be present, and all beekeepers who are not members are invited to attend and become members. Don't fail to write to the president at Hastings, Minn.

Wm. Danforth, Secretary, Red Wing.

J. P. WEST, President, Hastings, Minn.

DRAINED MARSHES FOR CELERY.

Speaking of drained marshes, Prof. Henry Snyder, in a recent bulletin from the Minnesota Experiment Station, says:

"On account of the usual abundance of lime, there is but little tendency for sour mould to form, hence these soils are quite easily reclaimed. When dry they have a very light weight per cubic foot. They all have the power of holding large quantities of water, in some cases as high as 125 per cent., hence, in their usual condition in the field, they are quite heavy on account of the large quantity of water which they carry. Many of these places have nearly the same composition as some of the best celery muck soils. There is a great deal of reserved fertility in these soils, which should be placed at the disposal of growing crops, either by drainage and reclaiming or, when rich enough, as muck, in the way outlined in the preceding article of this bulletin."

CLIMATOLOGICAL DATA FOR OCTOBER, 1895.

PLACE OF OBSERVATION.				TEMPERATURE IN DEG. FAH.							PRECIPITATION IN INCHES.					SKY.				
STATION.	COUNTY.	Elevation, feet.	Length of record, years.	Mean.	Departure fr'm the normal.	Highest.	Date.	Lowest.	Date.	Greatest daily range.	Total.	Departure fr'm the normal.	Greatest in 24 hours.	Total snowfall. (unmelted.)	Number rainy days.	Number clear days.	Number partly cloudy days.	Number cloudy days.	Prevailing direction of wind.	OBSERVERS.
NORTHERN SECTION.																				
St. Vincent	Kittson	805	7	34.6	— 0.5	79	12	9	29	45	0.74	—1.11	.34	4.0	6	7	14	10	N	H. W. Grasse.—÷
Roseau (b)	Roseau	....	....	37.4	.....	74	12	5	29	40	0.88	.....	.25	6.9	4	18	3	9	N W	Judge O. B. Ekman.
Koochiching	Itasca	1175	....	....	.....	....	....	....	....	....	....	.....	....	....	....	....	....	....	....	L. A. Ogaard.
Grand Portage (a)	Cook	602	....	32.0	.....	58	5	12	18	28	0.87	.....	.65	....	3	6	15	10	S W	Moses Madwayosh.
Tower	St. Louis	....	....	39.2	....	65	4	15	30	32	0.90	.....	.40	....	3	20	9	2	W	E. E. Barnidge.
Red Lake	Beltrami	1150	....	....	.....	....	....	....	....	....	....	.....	....	....	....	....	....	....	....	Rev. Francis Willis, Jr.
Crookston	Polk	863	7	40.7	— 2.0	78	12	9	29	43	0.40	—1.26	.40	0.5	1	13	9	9	N W	A. G. Anderson.
Ada	Norman	906	....	38.7	.....	79	17	—1	29	52	0.37	.....	.37	0.1	1	18	6	7	N	Fred Andrist.
LakeWinnibigoshish	Cass	1290	8	35.7	— 5.8	*69	4	*14	30	....	0.28	—1.09	.28	....	1	12	6	13	W	W. L. Maddy.
Leach Lake	Cass	1292	8	37.7	— 3.4	*67	12	5	30	....	0.18	—1.30	.10	....	2	16	0	15	N W	Jno. Ellingson.
Pokegama (a)	Itasca	1290	9	34.4	— 4.7	*71	5	8	30	....	0.18	—1.50	.18	2.2	1	6	10	15	N W	B. C. Finnegan.
Mountain Iron	St. Louis	....	....	37.2	.....	68	6	5	30	38	0.50	....	.30	....	7	13	10	8	W	F. R. Harvey.
Two Harbors	Lake	602	....	42.2	....	70	5	16	30	31	0.50	.....	.18	3.5	6	11	13	7	N W	H. L. Holden.
Duluth	St. Louis	656	25	42.0	— 2.5	70	5	18	30	27	0.09	—2.69	.04	....	4	9	14	8	N E	James Kenealy.—÷
Sandy Lake	Aitkin	....	4	38.6	— 3.8	*66	5	9	30	....	0.03	—1.40	.03	....	1	7	6	8	N W	Chas A. Hunt.
Pine River	Crow Wing	....	9	40.0	— 2.4	*68	5	*9	29	....	0.18	—1.40	.08	1.0	5	16	13	2	W	Neil McKay.
Park Rapids	Hubbard	....	5	38.2	— 1.5	72	17	4	29	43	0.21	—1.50	.11	2.1	2	15	9	7	N W	P. A. Walling, M. D.
Moorhead	Clay	935	15	41.1	— 1.4	81	17	3	29	48	0.21	—2.03	.12	1.6	5	13	8	10	N W	C. D. C. Thompson.—÷
AVERAGES.		....	10	38.1	— 2.8	....	....	....	....	39	0.41	—1.53	....	2.4	3	13	9	9	N W	-
CENTRAL SECTION.																				
Fergus Falls	Otter Tail	1190	9	41 8	— 3.0	73	12	7	29	41	0.10	—1.15	.05	0.7	3	15	11	5	N W	F. J. Kneeland.
St. Olaf	Otter Tail	1485	4	41.4	— 2.8	76	12	11	29	45	0.28	—0.75	.08	1.0	2	11	14	6	N W	Rev. O. A. Norman.
Campbell	Wilkin	984	....	....	.....	....	....	....	....	....	....	.....	....	....	....	....	....	....	....	Fred R. Barnes.
Lawrence (b)	Mille Lacs	1246	....	43 1	....	69	5	7	31	39	0.10	...	.10	1.0	1	16	10	5	N W	Samuel Mattson.
Long Prairie	Todd	1260	4	39.7	— 2.9	60	17	8	30	41	0.04	—1.02	.04	T	1	9	9	13	N W	A W. Sheets.
Alexandria	Douglas	1391	10	....	.....	....	....	....	....	....	0.06	—0.96	.02	0.5	3	17	4	10	N W	W. E. Chidestor.
Sauk Center	Stearns	1244	3	41.6	+ 0.6	72	17	8	20	44	T	—0.75	T	T	0	21	6	4	N W	L. E. Coe.
Beardsley (b)	Big Stone	....	3	45.0	— 1.7	80	3	4	29	50	0.68	—0.51	.52	1.0	4	24	4	3	N W	H. B. Gelting.
Morris	Stevens	1170	11	43.0	— 1.6	75	17	1	27	45	T	—1.00	T	T	0	20	7	4	N	D. T. Wheaton.
Glenwood	Pope	1403	....	41.5	.....	74	3	8	29	42	0.07	.....	.07	....	1	10	17	4	N W	C. L. Peterson.
Collegeville	Stearns	1282	3	44 8	— 2.6	75	17	14	20	43	T	—0.50	T	T	0	16	5	10	N W	Anselm Ortman, O.S.B
St. Cloud	Stearns	1020	18	40.4	— 5.5	68	1	10	29	38	T	—1.55	T	T	0	10	9	12	N W	S. Marlatt, M. D.
Cambridge	Isanti	1000	4	41.1	— 3.9	71	1	12	29	44	T	—1.36	T	....	0	8	16	7	N W	O. A. Hallin.
Sunrise City	Chisago	....	....	40.1	.....	*68	1	*4	29	...	0.15	.....	.05	1.5	3	16	7	8	S	J. O. Fitch.

Clear Lake	Sherburn	991	4	40.7	— 3.9	79	3	9	30	43	0.07	—1.40	.04	....	2	15	12	4	.....	W. V. Davee.
Clearwater	Wright	960	3	40.7	— 3.4	*71	1	*15	29	....	....	—0.74	....	....	....	10	14	7	W	S. M. Phillips.
New London	Kandiyohi	1215	....	43.0	.....	78	1	10	28	52	T	.....	T	....	0	5	25	1	N W	Harold Swenson.
Milan	Chippewa	995	3	44.0	— 1.4	80	1	2	29	48	0.10	—0.82	.10	1.0	1	7	22	2	N W	O. K. Opjorden.
Willmar	Kandiyohi	1131	3	40.8	— 2.7	74	1	5	29	45	T	—0.98	T	T	0	25	4	2	N W	A. F. Elfstrum.
Bonniwells Mills	Meeker	...	3	44.0	— 2.8	75	1	12	28	47	T	—1.42	T	....	0	25	2	4	S E	J. A. Quick.
Maple Plain	Hennepin	1023	4	42.4	— 4.0	73	1	13	30	36	0.10	—1.32	.05	0.4	4	17	6	8	N W	Geo. W. Richards.
AVERAGES.		....	6	42.1	— 2.8	....	....	....	....	44	0.09	—1.01	....	0.5	1	15	10	6	N W	
SOUTHERN SECTION.																				
Minneapolis, W. B.	Hennepin	933	5	44.9	— 4.8	73	1	16	29	41	0.05	—1.63	.02	0.4	3	14	9	8	S	Central Office.
Mpls, V. O. No. 1	Hennepin	....	31	43.2	— 2.6	71	1	14	**29**	40	0.09	—1.80	.05	0.5	3	17	6	8	N W	Wm. Cheney.
Mpls, V. O. No. 2	Hennepin	....	3	41.8	— 4.0	*70	1	11	30	....	0.08	.....	.03	0.5	3	17	6	8	S W	J. H. Aschenbeck.
St. Paul	Ramsey	850	25	43.8	— 3.6	73	1	15	30	39	0.09	—1.82	.04	0.6	4	16	5	10	W	P. F. Lyons—†
Montevideo	Chippewa	900	6	45.8	— 2.4	79	1	8	29	46	T	—1.08	T	T	0	11	18	2	N W	L. G. Moyer.
Dawson	Lac qui Parle	1054	....	41.3	.....	*80	3	*2	29	....	T	....	T	....	0	10	12	9	N	K. Sather.
Granite Falls (g)	Yellow Medicine	941	....	41.7	.....	78	1	6	29	51	T	.....	T	T	0	17	8	5	N W	J. G. C. Johnson.
Bird Island	Renville	1089	6	42.8	— 4.1	78	2	5	29	44	T	—0.72	T	T	0	13	9	9	N W	F. L. Puffer, M. D.
Hutchinson	McLeod	1040	....	41.8	.....	72	3	8	28	38	T	.....	T	T	0	19	7	5	N W	A. H. Roesboom.
Glencoe	McLeod	1006	....	42.4	.....	74	3	9	30	45	0.00	.....	0	0	0	23	2	6	.....	E. E McIntire.
Shakopee	Scott	753	....	43.4	.....	*68	3	12	30	...	0.10	.....	.10	....	1	13	10	8	N W	Wm. Willson.
Carver	Carver	722	....	....	.....	....	....	....	....	....	....	.....	....	....	....	....	....	....	.....	O. C. Brunius.
Belle Plaine	Scott	728	3	37.5	— 5.6	*68	4	*10	29	..	T	.....	T	.	0	26	1	4	N W	Geo. Schoell & Son.
Farmington	Dakota	902	8	42.1	— 4.4	72	1	10	30	48	0.27	—1.18	.20	T	3	17	7	7	N W	D. F. Akin.
Red Wing	Goodhue	708	11	....	.....	....	....	....	....	....	0.18	—1.71	.18	...	1	....	....	....	.....	Willis F. George.
Wabasha	Wabasha	711	4	42.1	— 5.7	*73	1	*14	30	..	0.40	—1.56	.16	1.0	3	15	5	11	W	J. A. Peck.
Mazeppa	Wabasha	934	3	41.7	— 2.8	*76	2	*4	30	....	0.90	—1.17	.70	....	2	24	5	2	S W	Levi E. Scruby.
Zumbrota (h)	Goodhue	979	...	41.3	.....	*68	5	*13	30	....	....	.....	....	....	....	16	1	8	N W	W. C. Rowell.
St. Peter	Nicollet	812	3	43.1	— 4.2	80	3	10	28	50	0.18	—1.19	.18	....	1	12	7	12	W	James Bennett.
New Ulm	Brown	837	17	45.4	— 2.3	75	3	10	29	44	T	—1.72	T	T	0	15	16	0	N W	Andrew J. Eckstein.
Camden (a)	Lyon	....	4	43.8	— 3.4	74	3	10	31	43	0.23	—1.02	.23	....	1	22	5	4	N W	Jacob Rouse.
Bingham Lake	Cottonwood	1423	...	....	.....	....	....	....	....	....	....	.....	....	....	....	....	....	....	.....	.....
Pleasant Mounds	Blue Earth	..	....	45.6	.....	75	3	10	29	40	0.18	.....	.18	...	1	25	4	2	N W	J. S. Parks.
New Richland (d)	Waseca	....	3	43.2	— 3.9	*74	3	*12	29	....	....	.....	....	....	....	19	6	2	N W	N. O. Tyrholm.
Blooming Prairie	Steele	1286	5	42.6	— 4.6	70	**2**	8	31	39	0.25	—1.53	.25	T	1	15	9	7	N W	C. B. Pettle.
St. Charles	Winona	1131	6	41.4	— 3.8	67	**26**	11	30	37	0.73	—2.27	.35	T	4	17	7	7	**S W**	H. W. Hill.
Minnesota City	Winona	740	3	43.4	— 3.7	70	5	10	30	38	0.35	—1.57	.38	T	3	16	7	8	S W	H. B. Waterman.
Winona	Winona	662	7	43.2	— 3.2	68	13	14	30	35	0.51	—1.19	.31	T	3	15	8	8	N W	W. F. Pett.
+La Crosse, Wis	La Crosse	720	23	44.9	— 4.5	72	2	13	30	41	0.54	—1.86	.29	T	5	13	9	9	S	W. U. Simons—†
Caledonia	Houston	1179	3	42.4	— 4.5	70	26	13	30	40	0.55	—1.32	.30	T	4	18	5	8	S	Jed. Pope.
Grand Meadow	Mower	1338	9	40.5	— 3.6	76	2	11	29	41	0.30	—1.71	.17	T	3	15	7	8	S W	C. F. Greening.
Albert Lea	Freeborn	1229	6	43.4	— 1.9	72	2	11	29	38	0.50	—0.53	.38	T	2	21	5	5	N W	W. Buel.
Rolling Green	Martin	1400	....	....	.....	....	....	....	....	....	....	.....	....	....	....	....	....	....	.....	Capt. F. Wherland.
Worthington	Nobles	1613	....	44.6	.....	72	2	13	29	33	0.67	.....	.67	....	1	18	13	0	N W	Prof. E. L. Porter.
Lu Verne	Rock	1454	....	....	.....	....	....	....	....	....	....	.....	....	....	....	....	....	....	.....	Miss Laura E. Hinkly.
AVERAGES.		....	8	42.9	— 3.8	....	....	...	....	41	0.25	—1.41	....	0.2	2	17	8	6	N W	
AVERAGES STATE.		....	7	41.4	— 3.2	...	....	....	....	41	0.24	—1.29	....	0.8	2	15	9	7	N W	

* From observed readings. (a) One day missing. (b) Two days missing, etc. —† Weather Bureau Officials. T Indicates a trace.
NOTE:—If more than one direction or date is given, the first are only recorded and set in bold face type.
+ Received too late to include in sums and means.

CLIMATOLOGICAL STATISTICS.

Reports for October were received from 66 stations. The average rainfall from the records of 62 stations was 0.24 inches ranging from 0.00 at Glencoe to 0.90 inches at Mazeppa and at Tower.

The average number of days with rainfall was 2.

The average temperature from the records of 62 stations was 41.4°. The highest monthly mean temperature was 45.8° at Montevideo and the lowest 32° at Grand Portage. The maximum temperature for the month was 81 degrees at Moorhead on the 17th. The minimum was one degree below zero at Ada on the 29th. The absolute range for the month and the state therefore was 82 degrees. The greatest local monthly range was 80 degrees at Ada, the least, 46 degrees at Grand Portage. The greatest daily range was 52° at Ada on the 12th, and at New London on the 26th, and the least, 0 at Grand Portage on the 7th.

From the records of 63 stations reporting the state of weather, there were on an average 15 clear, 9 partly cloudy and 7 cloudy days.

The prevailing direction of the wind as determined from 61 stations was N. W.

IN MEMORIAM.

MRS. CHAS. G. PATTEN, CHARLES CITY, IOWA.

We are called upon to record the sudden death of Mrs. C. G. Patten, who died of heart failure at her home in Charles City, Ia., on the 12th day of October, 1895.

Mrs. Mary Ann Patten was born in Brighton, Me., February 3, 1842; and was the daughter of Henry C., and Mary Ann Whittier. She came with her parents to Green Lake Co., Wis., in July, 1846, where she lived through her girlhood years. She was married December 28, 1863, to Charles G. Patten, and in November, 1864, the young couple came to Charles City, Ia., where they have since resided until her decease. Mrs. Patten was the mother of six children, three sons and three daughters, and her husband, three sons and two daughters survive her. She was an amiable and consistent christian woman, was deeply interested in the temperance reform, an active member of the W. C. T. U. and a gentle, loving wife, mother and friend who looked well after the comfort and happiness of her family. Mr. Patten is well known in this society as an enthusiastic experimental horticulturist and an honorable nurseryman, and in this hour of sad bereavement he and sorrowing members of the family have the full heartfelt sympathy of his large number of friends in the ranks of the Minnesota State Horticultural Society.

J. S. HARRIS.

THE "DUCHESS" AT LAKE MINNETONKA.

PROGRAM

OF THE

TWENTY-NINTH ANNUAL MEETING

OF THE

MINNESOTA

State Horticultural Society

TO BE HELD IN THE

THE NEW COURT HOUSE,

AT

MINNEAPOLIS, MINN.

Tuesday, Wednesday and Thursday,

DECEMBER 3, 4 AND 5, 1895.

LADIES ARE ESPECIALLY INVITED.

SEND OR BRING QUESTIONS FOR THE QUESTION BOX.

ANNOUNCEMENT.

In accordance with the nearly uniform practice of this society of holding the annual meeting every alternate year in the Twin Cities, the meeting will this year convene in Minneapolis. The conveniencies for reaching this point from all parts of the state are such that we may reasonably expect a large gathering.

It has been thought best to reduce the length of the meeting from four to three days. For some years past, joint sessions have been held with the forestry and beekeepers' associations, giving up to each of these societies a portion of the time. This change will confine the program of our meeting more strictly to horticultural topics and give an opportunity for the other two associations to hold their meetings on Friday, the day following the close of our session, without interfering in any way with one another. We hope this change may be in the direction of more efficient work for all parties.

The special features of this annual meeting are: first, the fruit exhibit, and second, a review of the condition of apple growing in our state. Arrangements have been made for what we believe will be the largest exhibit our society has ever made at its annual meeting. Considerable fruit has been placed in cold storage in Minneapolis with that object in view. Some additions have also been made to the premium list, and slight changes in the direction of recognition of the worthier varieties. You can add to this exhibit by bringing or sending whatever fruit is still in your possession, and we hope, as far as possible, every member in attendance will have a part in this feature of the program.

Prof. S. B. Green and Mr. Clarence Wedge, as you are aware, spent considerable time in making a tour of the orchard regions of the state and have prepared reports which will be certain to present many points of vital interest.

A number of well known horticulturists from other states, the names of some of whom will be found in the program, have given assurance of their intention to be present. Their attendance will add very materially to the interest of the occasion.

The program as prepared is not as full as usual, but it has been found that the discussions were of such value that it is not wise to curtail them by the presentation of too many papers.

REDUCED RAILROAD RATES.

READ CAREFULLY.

A reduction to one-third railroad fare for the return trip has been secured on condition that *one hundred certificates*, showing that full fare has been paid coming to this meeting, are presented to the railroad agent at Minneapolis. It is certain that this reduction can be secured if *each person attending* obtains such a certificate from the railroad agent at the time of purchasing the ticket. *Do not fail also* to get a similar certificate *at each transfer point* where you have to purchase a ticket on the way to the meeting. The certificate secured with the *last ticket bought* before reaching Minneapolis is the most important and the *only one* that will be counted in the required "one hundred."

N. B.—On reaching Minneapolis turn these certificates over to Sec'y Latham at once.

All the railroads in the state south of Minneapolis, also the Great Northern and Northern Pacific railways, offer this reduced fare.

DO NOT FAIL TO GET CERTIFICATES.

Come, *everybody* interested in any branch of horticulture! It is *your* loss if you stay away.

Will the papers of the state please give wide circulation to this notice?

For further particulars address

J. M. UNDERWOOD, President,
Lake City.

A. W. LATHAM, Secretary,
207 Kasota Blk., Minneapolis.

PROGRAM.

TUESDAY MORNING SESSION.

10 o'clock.

General Subject—Small Fruits.

Opening remarks by the president.

Appointment of committee on credentials

Report of committee on small fruits.

John Eklof, Cokato.
A. H. Brackett, Long Lake.
W. J. Hopkins, Bloomington.
M. Cutler, Princeton.
E. E. Harris, La Crescent.

Strawberry Culture,
R. J. Coe, Fort Atkinson, Wis.

Strawberries versus Drouth,
M. Pearce, Chowen.

Blackberries at Lake Minnetonka,
Thos. Redpath, Long Lake.

Anthracnose of the Raspberry,
R. S. Mackintosh, St. Anthony Park.

Late Hints on Small Fruits,
C. L. Smith, Minneapolis.

Announce renewal of membership. Annual fee, $1.00. Pay to the Secretary.

TUESDAY AFTERNOON SESSION.

2 o'clock.

General Subject—Grapes, Plums and Apples.

Report of committee on grapes.

E. J. Cutts, Howard Lake.
Wm. Morris, Excelsior.
R. C. Carroll, St. Anthony Pk.

A Delaware Vineyard,
C. W. Sampson, Eureka.

Report of committee on plums and cherries.

Dewain Cook, Windom.
G. J. Gjemse, Hader.
C. W. H. Heideman, New Ulm.

Plums as a Source of Profit,
Dewain Cook, Windom.

A Farmer's Plum Grove,
Prof. O. C. Gregg, Minneapolis.

Report of committee on seedling fruits,
J. S. Harris, La Crescent.

Report of committee on apples,

R. H. Buttermore, Lake City.
Chas. Luedloff, Carver.
D. K. Michenor, Etna.
J. P. Andrews, Faribault.

My Orchard—What I Have Found and Lost In It,
O. H. Bullis, Winnebago City.

Appointment of committees on award of premiums, president's address, obituaries and final resolutions.

TUESDAY EVENING SESSION.

7:30 o'clock.

General Subject — Addresses and Annual Reports.

President's annual address,
J. M. Underwood, Lake City.

Annual report of the executive committee,
Wyman Elliot, Chair'n, M'p'lis.

Annual report of secretary,
A. W. Latham, Minneapolis.

Annual report of treasurer,
F. G. Gould, Excelsior.

Annual report of librarian.

(The library is at No. 207 Kasota Block, Minneapolis.)
A. W. Latham, Librarian.
E. A. Cuzner, Assistant Librarian.

(The assistant has charge of the reports stored at Pillsbury Hall, State University.)

Report of committee on legislation,
Wyman Elliot, Chair'n, M'p'lis.

Report of delegate to N. E. Iowa Hort. Society,
O. M. Lord, Minnesota City.

Notes on European Horticulture,
Prof. N. E. Hansen, Brookings, S. D.

The Ideal Horticulturist,
Prof. H. W. Brewster, St. Anthony Pk.

WEDNESDAY MORNING SESSION.

9 o'clock.

General Subject—Apples, cont.

Topworking the Apple,
Sec'y A. J. Philips, West Salem, Wis.

A City Orchard,
H. R. Birch, Minneapolis.

The Orchards of Minnesota in August, 1895.
Clarence Wedge, Albert Lea.
Prof. S. B. Green, St. Anthony Park.

Reports of vice-presidents.

E. H. S. Dartt, First Congressional District, Owatonna.

S. D. Richardson, Second Congressional Dist., Winnebago City.

Mrs. A. A. Kennedy, Third Cong'l District, Hutchinson.

R. S. Mackintosh, Fourth Cong'l District, St. Anthony Park.

Col. J. H. Stevens, Fifth Cong'l District, Minneapolis.

J. O. Barrett, Sixth Congressional District. Brown's Valley.

Mrs. Jennie Stager, Seventh Cong'l District, Sauk Rapids.

WEDNESDAY AFTERNOON SESSION.

2 o'clock.

General Subject—Experiment Stations.

Before and Behind the Scenes,
J. S. Harris, LaCrescent.

Superintendents of Experiment Stations, 1895.

Prof. S. B. Green (State Agricultural Experiment Station) ..... St. Anthony Park.
E. H. S. Dartt ..... Owatonna.
F. H. Fiedler ..... Fergus Falls.
Dewain Cook ..... Windom.
Clarence Wedge ..... Albert Lea.
Chas. W. Sampson (grapes) ..... Eureka.
O. M. Lord (plums and small fruits) ..... Minnesota City.
C. W. H. Heideman (plums and small fruits) ..... New Ulm.
H. M. Lyman (apples) ..... Excelsior.
J. S. Harris ..... La Crescent.
L. R. Moyer ..... Montevideo.
Mrs. Jennie Stager ..... Sauk Rapids.
Wm. Somerville ..... Viola.

Climatic Modification of Fruits,
A. F. Collman, Corning, Ia., delegate from Ia. State Hort'l Society.

My Fight with the Animal Kingdom,
Mrs. Sophronia Erwin.

Report of committee on nomenclature and catalogue.
J. S. Harris, La Crescent.
Prof. S. B. Green, St. Anthony Park.

Report of committee on fruit blossoms.
R. S. Mackintosh, St. Anthony Park.
L. R. Moyer, Montevideo.
C. W. H. Heideman, New Ulm.

Report of committees on award of premiums.

LIFE MEMBERSHIP FEE, $10.00.
This may be paid in two equal annual installments.

WEDNESDAY EVENING SESSION.

7:30 o'clock.

General Subject—Floriculture and Arboriculture.

Forestry,
J. O. Barrett, Brown's Valley.
Prof. T. A. Williams, Brookings, S.D.
D. R. McGinnis, St. Paul.

Will it Pay to Grow the Black Walnut?
J. R. Cummins, Washburn.

The Mulch,
J. O. Barrett, Sec'y Minn. State Forestry Ass'n, Brown's Valley.

Tree Growing on the Couteaux of Southwestern Minnesota,
F. H. Pratt, Camden.

Report of committee on deciduous trees and shrubs,
Wm. Somerville, Viola.
J. Cole Doughty, Lake City.
O. K. Opjorden, Milan.

The Newer Shrubs and Trees,
J. Cole Doughty, Lake City.

The Landscape Gardener in the Country,
F. H. Nutter, Minneapolis.

Report of committee on evergreens,
H. B. Ayres, Carlton.
Rev. O. A. Th. Solem, Halstad.
A. Norby, Madison, S. D.

Native Evergreens,
H. B. Ayers, Carlton.

Report of committee on out-door herbaceous plants,
Mrs. Anna B. Underwood, LakeCity.
Wm. Wachlin, Faribault.

Report of committee on house and greenhouse plants,
Aug. S Swanson, Endicott Arcade, St. Paul,
Archie Wheeler, St. Anthony Park.

THURSDAY MORNING SESSION.

9 o'clock.

General Subject—Fruit List.

Report of committee on fruit list.
Clarence Wedge, Albert Lea.
Prof. S. B. Green, St. Anthony Pk.
S. D. Richardson, Winnebago City.

How I Grow Peaches,
O. M. Lord, Minnesota City.

Utilize the Waste Places,
J. M. Underwood, Lake City.

Our Exhibit at the State Fair,
Wm. Somerville, Viola.

Announce election for the afternoon and renewal of membership. Annual fee, $1.00. Life membership fee, $10.00.

THURSDAY AFTERNOON SESSION.

2 o'clock.

General Subject—Election of Officers, Irrigation and Vegetables.

Report of committee on irrigation.
Prof. S. B. Green, St. Anthony Pk.
D. R. McGinnis, St. Paul.
A. H. Brackett, Minneapolis.

My Artesian Well,
Wm. Danforth, Red Wing.

Irrigation with Reservoir,
Geo. W. Whiting, Yankton, S. D.

(Prof. E. S. Goff, of the Wisconsin Experiment Station, expects to be in attendance and present the subject of irrigation.)

3:30 o'clock, annual election of officers.

Report of committee on vegetables.
D. T. Wheaton, Morris.
L. H. Scofield, Bloomington.
T. G. Gearty, Robbinsdale.
G. H. Prescott, Albert Lea.

In the Vegetable Garden,
Geo. H. Prescott, Albert Lea.

Cabbages in the Market Garden,
J. W. White, Minneapolis.

THURSDAY EVENING SESSION.

7:30 o'clock.

General Subject—Apiculture, Entomology, Ornithology, Pantry Stores and Unfinished Business.

Report of committee on cooking and pantry stores.

Mrs. Harry Snyder, St. Anthony Park.
Mrs. E. Cross, Sauk Rapids.
Mrs H. R. Reeve, Lake City.

Report of committee on apiculture.

John Turnbull, La Crescent.
Wm. Danforth, Red Wing.

Report of committee on entomology.

Mrs. A. A. Kennedy, Hutchinson.
J. S. Harris, La Crescent.

Insects and their Friends,
Prof. Otto Lugger, St. Anthony Park.

A Lantern Talk, Illustrated by Stereoptican Views.
Prof. S. B. Green, St. Anthony Park.

Report of committee on ornithology.

Wm. T. Shaw, St. Anthony Park.
F. I. Harris, La Crescent.

Unfinished business.

Report of committee on obituaries and final resolutions.

9:30 P. M.—Two minute speeches by the members.

9:45 P. M.—Closing remarks by the president.

PREMIUM LIST.

All exhibits must be entered with the secretary and in place the first day of the meeting to be entitled to compete for premiums.

Exhibitors competing must be members of this society and the growers or makers of the articles exhibited. The articles exhibited must have been grown in Minnesota or manufactured from Minnesota grown products.

Each exhibit of fruit must consist of four specimens, except when otherwise noted.

No premium will be awarded on unworthy exhibits.

APPLES AND CRABS.

	1st Prem.	2d Prem.
Collection	$5.00	$3.00
Each variety exhibited included in the fruit list of this society for 1895	1.00	.50
Each variety exhibited not included in above mentioned list	.50	.25
Seedling apple, never before exhibited	3.00	2.00

GRAPES.

Collection	5.00	3.00
Each variety exhibited	1.00	.50

PLANTS IN POTS.

Collection of ornamental and flowering plants	5 00	3.00
Single rose in bloom	1.00	.50
Single geranium in bloom	1.00	.50
Single begonia in bloom	1.00	.50
Single carnation in bloom	1.00	.50

CUT FLOWERS.

Floral design	5.00	3.00
Collection of cut roses	2.00	1.00
Collection of cut carnations	2.00	1.00
Table bouquet	2.00	1.00
Basket of flowers	2.00	1.00

VEGETABLES.

Early potatoes, single variety, one-half peck	1.00	.50
Late potatoes, single variety, one-half peck	1.00	.50
Onions, single variety, one-half peck	1.00	.50
Turnips, single variety, " "	1.00	.50
Beets, single variety, " "	1.00	.50
Parsnips, single variety, " "	1.00	.50
Celery, single variety, " "	1.00	.50
Hubbard squash, (one specimen)	1.00	.50
Cabbage, (one specimen) single variety	1.00	.50
Cauliflower, (one specimen) single variety	1.00	.50

HONEY.

Collection of comb honey, *ad libitum*	5.00	3.00
Collection of extracted honey, "	3.00	2.00

Dealers in horticultural implements and appliances are invited to place them on exhibition.

CALENDAR FOR DECEMBER TO MARCH.

J. S. HARRIS, LA CRESCENT.

The principal work of the amateur and farmer horticulturist for the three winter months is to see that all the November work has been finished up in good shape, watch out for rabbits and mice and take proper precautions to guard against damages from them; also, to see that gates and fences do not get open, broken down or out of repair; stock in the orchard and garden now will do more damage by breaking down and browsing in a few hours than can be repaired in a season's growth. If the small fruit grower is up with his work, his strawberry beds are mulched, raspberry, blackberry bushes and grape vines laid down and made secure, and he has before him a long season of comparative rest from care, anxiety and hard manual labor and ample time for reading, study and planning for the next season's business.

Not so with the *nurserymen and professional florist.* With them much of future success depends upon a winter well improved. The propagation of plants and care of the greenhouses must not be neglected. The nurseryman will need to cut and secure scions and get ready for root grafting, which may begin in January. Canvassing for spring sales must be done, or he will find himself left with most of his stock on his hands, for the average planter has not yet learned the wisdom of ordering direct from the grower. Labels and stakes are to be prepared, and everything done that will expedite the spring delivery and get it off his hands so that his own planting of root grafts and shrubbery may be done in season.

Other work. Be sure that ladders, boxes, barrels and stakes are put under shelter for the winter. All implements and tools should be cleaned and housed. Winter will afford plenty of time for repairing, repainting and putting them in order for the spring use. Heavy drifting snows are liable to do damage to low branching young trees and especially to evergreens. The only way to prevent such injury is to shake the accumulated snow off carefully and to tramp it down firmly around the trees immediately after every snowstorm, and this will also prevent much mischievous work by mice.

In case of heavy rains and the melting of snows, the surface water should be promptly given a chance to run off from the orchard grounds and berry patches. Surface water in winter is the one thing above all others that fruit trees and berry plants dislike. Manure is a valuable aid to the raiser of fruits and vegetables, and the preserving of it and its application to the ground are important considerations. Winter is a capital time to attend to securing an ample supply of it. Where practical it should be spread over the ground as it is hauled out, that it may be ready to give out its valuable fertilizing elements with the starting of vegetation in the spring.

Finally. The winter season is a dull one in the orchard and gardens, but the long evenings and stormy days afford ample time for cultivating the mind. Good books are cheap, bulletins of the expe-

rimental stations can generally be had by asking for them, and there are many papers published that contain matter invaluable to the horticulturist. It is also the season when most of the horticultural societies hold their annual meetings. Every progressive horticulturist and farmer should be a member of one or more societies. There is room in the Minnesota society for twenty thousand members, and the benefits they would receive by being members would be ten times more valuable than the cost. This month is a good time to join. Most of the farmers' institutes are held in winter, and every one who possibly can should attend them. Then ask for it, and more attention will be given in them to instruction on horticulture. Winter is also a good time for starting horticultural clubs, libraries, reading rooms, etc. A few back horticultural reports make a good nucleus for the library and reading room. Try it on this winter! And that all may enjoy a merry Christmas and happy New Year is the sincere wish of the writer.

A BLACKBERRY-RASPBERRY CROSS.

The Loganberry originated several years ago in the garden of Judge J. H. Logan, of Santa Cruz, from self-grown seeds of the Auginbaugh, springing up in the moist, warm soil of that sheltered district. The other parent is supposed to be a raspberry of the Red Antwerp type. Raspberries of several sorts grew alongside, and, in fact, intermingled. The Loganberry shows so clearly the mingling of both types that no horticulturist who studies the fruit has doubted that it is a true hybrid of the Auginbaugh blackberry with some large, red, European raspberry. The result is a very sturdy plant of rambling or trailing growth, needing support to be at its best, but even in this dry climate it is a vine of unusual substance and healthfulness, resembling the Auginbaugh blackberry, but really distinguished from it in the field. The berry is large and solid, resembling the Auginbaugh in shape and retaining its delicious, wild flavor; it is dark red to purple when fully ripe, and shows its texture in the easy slipping from the core, and partly in flavor the raspberry parentage.

Tests made in different soils and in some very dry situations have shown, so far, that the Loganberry will grow and bear a fair amount of fruit in localities where the gooseberry, currant and high-bush varieties of blackberries and dewberries have entirely failed. As I have said, plants of *Rubus ursinus* are sometimes found thriving very well on dry hillsides, with scrub oak and chaparral, but seldom bear fruit to any extent in such arid places. In other words, some individuals of this variable species of Rubus grow in very hot, arid and barren places, and the original Auginbaugh, though found on a sandy peninsula, near the bay, instead of on a hillside, seems to have had the power to transmit this resistant quality, together with an increased productiveness. The Loganberry is now grown for market, and the results are said to be gratifying, both in regard to price and yield.—*Garden and Forest.*

Secretary's Corner.

THE ILLINOIS STATE HORTICULTURAL SOCIETY will hold its annual meeting at Kankakee, Dec. 10, 11 and 12.

NOTICE TO MEMBERS OF COMMITTEES.—A full attendance of members of committees is much to be desired at the annnal meeting, but any that cannot come are urgently requested to assist in the work by mailing their reports to the secretary prior to that date.

DELEGATE TO N. E. IOWA SOCIETY.—O. M. Lord, of Minnesota City, has consented to represent this society at the annual meeting of the Northeast Iowa Horticultural Society, which convenes at Hampton, Ia., Nov. 26 and 27. We may look for an interesting report of this meeting.

MINNESOTA BEEKEEPERS' ASSOCIATION, ANNUAL MEETING—President West of this association wishes members to note that the annual meeting will be held on Friday following the meeting of the Horticultural Society, i. e., Dec. 6; with perhaps a session or two on the day before.

THE GEORGE WASHINGTON PALM—This historic tree spoken of in the last issue as the former property of George Washington, was sold Oct. 17 to W. A. Manda, S. Orange, N. J., for $62. As Mr. Manda is a life member of this society, we can claim an interest in this interesting plant.

FRUIT IN COLD STORAGE FOR THE ANNUAL MEETING.—All the fruit now in cold storage at Minneapolis, held for that occasion, will be delivered at the hall of meeting Tuesday morning, but unless other arrangements are made, it is expected that each person will attend to setting up his own fruit.

RESERVOIRS WATERTIGHT BY PUDDLING—A late bulletin on "Irrigation" issued by the Nebraska Experiment Station says: "Small reservoirs which have been constructed for use in connection with windmill pumping and whose beds have been thoroughly puddled by cattle tramping through them, or by other means, are stated by their enthusiastic owners to hold water as well as cemented cisterns." "Thus it seems that by puddling the bed of a reservoir it may be made at once impervious."

1895 REPORT, WISCONSIN SOCIETY.—The annual report of our sister society came to hand a few weeks since. It is a little late in issuing, but full enough of good material to amply compensate for the delay. Many of the papers are of especial value to Minnesotians, and we hope to reproduce them later. I note that the president and the secretary in their reports say very kindly words for this society and the work it is doing, and especially for the monthly magazine. Every member of our society would be better off for a copy of the Wisconsin report.

Annual Meeting, Jan. 1895.

JOURNAL OF TWENTY-EIGHTH ANNUAL MEETING.

(For Program See Page 461, Report, 1894.)

TUESDAY MORNING.

The twenty-eighth annual meeting of the Minnesota State Horticultural Society, held in Masonic Hall at Lake City, Minn., January 8, 9, 10 and 11, 1895, was called to order by President J. M Underwood. A psalm was read by the president, the Lord's Prayer repeated by the audience, and the meeting was declared duly opened.

President Underwood: I assure you, friends, it is very pleas ant to meet you here this morning. It is announced in the pro gram that there are to be opening remarks by the president. I do not know that I have much to say to you this morning, ex cept to bid you a hearty welcome, and, as you will be more formally welcomed this evening, it will not be necessary for me to say much upon the point of your coming to Lake City. We have had the pleasure of meeting you here at Lake City before, and we are always glad to have our friends come here, and I hope the exercises we are going to have during this meeting will prove mutually interesting and instructive to us all. I think we have been very fortunate this winter so far in that we have had so little inclement weather, and I hope this will be the occasion of bringing out a large number of our friends from abroad. We want you to feel perfectly at home among us, and, if you do not see what you want, ask for it. We want every one to have a good time. I cannot say more than that, and I hope we shall be able to make everything interesting and pleasant for you all while you are here. (Applause.)

The president appointed the following committee on credentials: L. R. Moyer, Montevideo, J. P. Andrews, Faribault, and C. W. Sampson, Excelsior.

Secretary Latham: Mr. President, before commencing the program, I wish to call the attention of the society to a matter

in connection with the State Agricultural Society, which is in session at St. Paul today. I received a letter from Prof. Green a day or two since asking me to bring before this society certain resolutions looking toward the reorganization of the State Agricultural Society on a basis which should permit this and kindred organizations to have a proper representation in that society. Prof. Green desires that these resolutions be acted upon at once and that we telegraph him the result this morning.

The secretary then read the following resolutions: (See page 29.)

On motion of Mr. Harris the resolutions were adopted.

Secretary Latham: I have the report of the committee on credentials. The committee reports that Messrs. C. F. Gardner, of the Iowa State Horticultural Society, and L. G. Kellogg, of the Wisconsin State Horticultural Society, are entitled to represent their respective societies.

President Underwood: I have the pleasure of presenting to you Mr. L. G. Kellogg, President of the Wisconsin State Horticultural Society.

Mr. Kellogg. *Mr. President, Ladies and Gentlemen:* I have very little to say. It affords me great pleasure to meet with you at this time and occasion. I feel our interests are mutual, although our climatic conditions differ a little I thank you for the courtesy you have shown me, and trust I shall become well acquainted with the horticultural workers of Minnesota while I stay here. (Applause.)

President Underwood: I have the pleasure of introducing to you Mr. C. F. Gardner, of Osage, Iowa, who is very closely identified with the horticultural interests of Iowa

Mr. Gardner. *Ladies and Gentlemen of the Minnesota State Horticultural Society:* It gives me great pleasure to meet with you here today, and I have every reason to believe that the session you are about entering into will be a very successful one and very beneficial to us all, and I have come up here to visit you and to learn all I can in regard to your business here in the horticultural line. I will not take up any more of your time, but I will say that I am very much pleased with everything I have seen so far, and I am certain we shall have a good meeting. (Applause.)

President Underwood: The next thing on the program is a salutatory address by Mr. Harris, entitled "Old Ideas in a New Dress." J. S. Harris, La Crescent. (See index.)

Mr. S. D. Richardson, vice-president of the second congressional district, Winnebago City, then read the following report: (See index.)

This was followed by the report of R. S. Mackintosh, vice-president of the fourth congressional district, St. Anthony Park. (See index.)

Mrs. Jennie Stager, vice-president of the sixth congressional district, Sauk Rapids, then presented the following report: (See index.)

Mr. J. O. Barrett, vice-president of the seventh congressional district, Brown's Valley, made the following report: (See index.)

Mr. Robert Buttermore, of the first congressional district, Lake City, then read the following report on general fruits: (See index.)

Pres. Underwood: We shall not have time to discuss this report, as it is 12 o'clock, and the society stands adjourned until this afternoon at 2 o'clock.

TUESDAY AFTERNOON.

The meeting was called to order at 2 o'clock.

Pres. Underwood: Before we begin our program for this afternoon, there is one thing I want to speak of again. I do not want any one to feel as though they could not take part in the discussions and in the exercises at this meeting because they are not members. We want you to feel, whether members or not, as though you had a perfect right to take part in all the proceedings, and to speak on any subject we may have under discussion. This is whether you are a member or not; we do not restrict our deliberations to members only. There is only one matter in our proceedings in which members only can take part, and that is the election of officers, and we would be glad to have you all become members and to help the society by contributing the nominal sum of one dollar and receiving in exchange our monthly magazine and the annual report; but whether you do this or not, we want you to feel as though you were a member while you are attending our meetings, and any thought that occurs to you that may be of interest in the subject under consideration, any experience you may have had or any question you may wish to ask—I hope you will be perfectly free to do so. The reporter desires that when any one rises to speak he give his name that the report may be made complete, and we will try to accommodate him in that respect. We will

now have the pleasure of listening to a piano duet by Mrs. Cook and Miss Gillette.

These ladies then very acceptably entertained the society with an excellent instrumental selection.

Pres. Underwood: We will take up our program this afternoon where we left off this morning. The last paper read before dinner was a very interesting report by Mr. Robert Buttermore, of this city. I will say that Mr. Buttermore is a very successful farmer living about five miles out of the city, and he is also a very successful orchardist; a man who does things very well and is quite successful. If Mr. Buttermore were here, you might wish to ask him some questions in relation to his paper. As none of the other members of the committee on general fruits are present, we will next listen to the reports of vice-presidents.

F. W. Kimball, of the first congressional district, Austin, then read the following report: (See index.)

President Underwood: Mr. Wedge has a matter of business to bring up at this time.

Mr. Clarence Wedge: *Mr. President and fellow members:* On account of our society being in somewhat of a transition state at this time, and reaching forward to attempt greater things, it has seemed to some of us that we were rather outgrowing the constitution under which we have worked for a good many years with very slight modifications, and in order to add to the stability of the society what seems to be necessary in order to carry out the things we have in view, and also in order to carry out the idea that was suggested by our friend, Mr. Kimball, of the Southern Minnesota Society, we have prepared with considerable labor and thought a revised constitution to submit to you at this time. As you know, our constitution requires that in order to have it revised it is necessary to be submitted to the society a day before it is acted upon. In accordance with that clause in our constitution, I have this revised constitution to submit to you.

Mr. Wedge then read the revised constitution. (See page 6).

President Underwood: This matter will be taken up at the proper time, probably tomorrow.

Mr. Dartt: I would suggest that it be taken up rather early, so there will be time for discussion. You know we are always in a terrible hurry toward the end of our meetings.

Mr. Harris: Mr. Dartt will not be in a big hurry, because there will be good things to eat the last day. (Laughter).

Mr. J. S. Harris, of the committee on nomenclature and catalogue, made the following report: (See index).

Mr. O. F. Brand, of Fairbault, presented the following report of the committee on fruit blossoms, cross-fertilization, etc. (See index.)

R. S. Mackintosh, of St. Anthony Park, next read a paper on "Spraying at the State Experiment Station." (See index.)

At this point in the program Mr. Roy Underwood delighted the audience with a baritone solo, entitled "King David."

Pres. Underwood: The time for adjournment has come, but before we go I want to speak of a few matters of importance. One is in reference to memberships. All members are entitled to receive a bound copy of the 1894 annual report in addition to the monthly magazine which they receive during the year. The magazine is the same thing as that which is bound at the end of the year; the report is simply the twelve numbers of the magazine bound in one volume. I would call your attention to another arrangement that has been perfected. You will find on the inside of the cover of the magazine a list of permiums which will be given by the state experiment station to all new members, a choice of ten premiums, and you will find the list on the inside of the covers of the magazine, so that in addition to the monthly magazine and the bound volume, you get your choice of three of these premiums.

Pres. Underwood then adjourned the meeting to 7:30 o'clock in the evening.

TUESDAY EVENING.

The exercises of the evening were opened with a vocal selection rendered by Mrs. Young, of Lake City, entitled "Happy Days."

President Underwood: *Ladies and Gentlemen:* Let me introduce to you Mayor Titzell, who will now deliver the address of welcome.

Mayor Titzell then welcomed the society in the following words:

Mr. President, Members of the State Horticultural Society, the Bee-Keepers' Association and the State Forestry Association: It becomes my pleasant duty to welcome you to our city upon this occasion. We were happy when we read your acceptance, and we are happier still now that you are here. We stand ready to fulfil all the pledges and promises we have made. Lake City, as you know, is a quiet, unassuming and unostentatious little city, nestling among the hills by the lake. In behalf of the

common council of the city of Lake City, who have invited you here, and in behalf of the citizens of Lake City who have taken so much interest in your coming, and in behalf of those members who reside here, and in behalf of the local horticultural society, I bid you a hearty welcome. The gates are open, the latch strings out, and our people are at your service. Our welcome and our hospitalities we extend to you without any reservation whatever. Welcome is our greeting. (Applause).

Mr. E. H. S. Dartt, of Owatonna, then responded to the address in behalf of the society as follows:

Mr. President, Mr. Mayor, Ladies and Gentlemen: It affords me great pleasure to assure you that this hearty welcome is very highly appreciated by all the members of our society, and all the more so because it comes from the beautiful city by the lake.

We think of Lake City as the home of one of the brightest "Jewells" that ever adorned our society. His ways were truly the ways of pleasantness, and our fond recollections of him are wont to linger. He is gone now, but he has left his impress on what we see before us, fruits and flowers. Smiling faces, friendly greeting and soul inspiring song are the best boons on earth to mortals given, and especially to those of us in whom the rougher elements predominate.

If we can calmly face the southwest and draw in a hot breath from the American Sahara and then turn to the northwest and face the Minnesota blizzard without flinching, or, in other words, if we are ridiculously obstinate and ridiculously aggressive, and if we possess a great amount of self-reliance, which is but another name for self-conceit, then we are well qualified for the continuous pursuit of horticulture in Minnesota. Those of us who are thus constituted need not be surprised if we are compared to the prickly cactus that thrives on the most barren plains or to the persistent Russian thistle or even to the thorn in the flesh, and the worst of us may hear something about the fellow with long ears.

Now the best way to avoid trouble with the cactus is to keep away from it, and to subdue the thistle don't fight it but quietly stop it from germinating, and to avoid the thorn in the flesh keep the flesh away from the thorn, and to quiet the long-eared fellow most effectually I think of nothing better than death. The thought that we must die to be appreciated is not very consoling, but tardy justice is better than no justice at all, *unless* we happen to be in the position of a certain criminal who, on being assured that he would get justice, replied that that was just what he was afraid of.

Whilst we feel strong in our prowess as fighters,we are humiliated by the fact that we are powerless in the presence of one of our own productions—just wave the olive branch, and we are at your mercy. You Lake City people have discovered our weakness and you do not hesitate to improve your opportunity. You have adopted the tactics of a cunning woman when she would subdue one of the lords of creation. You meet us with sweetest smiles and words full of kindness, pathos and love; we reciprocate these tender emotions of yours

and feel a soothing, pleasurable sensation permeating our savage breasts, which, if we mistake not, is the music of the soul vibrating between us. We are happy, and we feel, like other lucky tramps, that we would like to stay with you always. But we will borrow a little of your cunning and tear ourselves away just before you get ready to kick us out. Then, perhaps, you will say "come again."

Yes, we had better go, and whenever there comes a lull in the battle of life we will look back to this happy time and enjoy over again the pleasures of this occasion.

When Minnesota horticulture shall have reached its final climax, it will not have been accomplished by any sudden transition or by the labors of a few, but it will come through the efforts of a great number of patient toilers who will each add a little to the general stock of applicable knowledge. This rather slow process will continue until the victory is finally won.

Whilst we clearly see that we are making rapid strides, yet we scorn the thought of grasping at honors in advance. So we will faithfully work on as best we can, paving the way for the rapid progress of our successors and fully realizing the fact that

"We're but a link in the great chain of ages,
And brighter far will be the future pages"

than these we write.

President Underwood then delivered the annual address. (See page 13).

Mrs. E. Chase, of Lake City, very pleasantly entertained the audience with an instrumental selection on the piano.

Secretary A. W. Latham then read his annual report as follows: (See page 21).

The annual report of the treasurer, Mr. Ditus Day, of Farmington, was next submitted to the society. (See page 26).

Following the reports a spice was added to the program in the shape of a baritone solo by Mr. Jewell, of Lake City, entitled "Night Time."

Mr. O. F. Brand, of Faribault, next read a selection from Pliny, entitled "The Home of Pliny."

Pres. Underwood: Before our concluding number I wish to say a word in regard to our program tomorrow. The general subject is apples, and the remarks that Mr. Dartt will make on horticultural frauds will be taken up at that time.

Mr. Roy Underwood then rendered a vocal solo, "King of the Forest," which brought forth rounds of applause.

The meeting was then declared adjourned until 9:00 o'clock, Wednesday morning.

WEDNESDAY MORNING.

The first number taken up was a deferred report of the committee on seedling fruits by J. S. Harris, of La Crescent. (See index.)

Pres. Underwood: We will now listen to a topic that was passed over last evening: "Horticultural Frauds," by Mr. E. H. S. Dartt. (See index.)

On motion of Clarence Wedge, the president was authorized to appoint a committee of three to prepare a law to prevent fraud in the sale of nursery stock, to be referred to the executive committee for their approval and then to the legislative committee to urge its passage.

Pres. Underwood appointed as such committee Mr. Clarence Wedge, Mr. L. R. Moyer and Mr. A. H. Brackett.

Pres. Underwood: I will say that Mr. S. W. Ferris has been appointed as delegate to our society from the Northeastern Iowa Horticultural Society. He is with us now, and we have had the pleasure of listening to him. If he has any remarks to make to the society at this time, we shall be glad to listen to him for a few moments.

Mr. Ferris (of Iowa): Mr. President, I do not wish to occupy your valuable time, because I think there are many others here who are more competent to entertain and instruct you than I am. It is a great pleasure to me to meet with horticulturists. I put in the best part of my life in that line, and my only sorrow is that I have not made a greater success of it. A year ago last fall there were some three hundred cars of apples shipped from our county, shipped from the part of the county I live in, mostly from three stations. There was no crop grown that turned me in as good results as the Duchess and Wealthy. There is no tree that bore so well with me as the Harry Kaump. It is comparatively a new variety, and I have always made it a practice to go slow on everything until it is thoroughly tested. I think it is worthy of trial in our section. The Minnesota bore us an immense crop this year, and I think it is worth propagating. With some of the Russian family I must say we have not met with the grand success we had anticipated. Prof. Budd claimed to have one hundred varieties better than the Duchess, but I have not found it so. I have one acre of Duchess that has netted me $500 in the last three years, and if I had set out all Duchess trees I would have been able to pay my debts, at least.

In our state we feel much encouraged in horticulture; we have new things coming on of which we have great hopes. I believe in the plan of going slow on new varieties. We still have some hopes of Patten's Greening and are planting some yet. I do not know as much about it as I do of the Duchess. I have a large lot of four year old trees to sell. I do not believe in taking a new thing and putting it out extensively, because in my experience in ninety-nine

cases out of a hundred, it turns out to be a failure. While I still have some hopes of Patten's Greening standing by us for years to come, I would not advise planting it extensively in a commercial orchard. There is no question in regard to the Hibernal and the Lieby in regard to their hardiness; it is the quality of fruit we like. They are comparatively free from blight and very hardy.

Mr. Wedge: We greatly appreciate the presence of our friends from Iowa and Wisconsin, and I move that Mr. Ferris of the Northeastern Iowa Horticultural Society, Mr. Gardner of the Iowa Horticultural Society and Mr. Kellogg and Mr. Philips of the Wisconsin Horticultural Society be made honorary members of our society for one year.

Being put to a vote the motion prevailed.

Pres. Underwood: I have the pleasure of introducing to you Mr. Philips.

Mr. A. J. Philips: I have attended your meetings for twenty-two years. I was elected an honorary member for five years, and I do not know whether my time is out or not. I live in Wisconsin, and I get more good out of your society than I do out of our own, and I am glad I am here. As I appear on the program later, I will say no more at this time.

The next paper on the program was read by Mr. M. Pearce, entitled "Nursery and Orchard Trees." (See index.)

Mr. A. J. Philips, secretary of the Wisconsin State Horticultural Society, then gave the following talk on "Seedling Ap ples:" (See index.)

Mr. O. F. Brand: The report I read yesterday on apple blossoms was not acted upon. I would like to have the society take action on it. In that report there were some recommendations. They were that $150 be appropriated annually for five years as needed, under proper restrictions, three men to spend five days each in making observations of apple blossoms and looking after seeds. They to make such crosses as their judgment recommended and opportunity permitted.

On motion of Mr. Wedge the matter was referred to the executive committee.

Mr. Harris: The committee on obituary has just received a notice that Prof. E. D. Porter, dean of the Agricultural College of Missouri, is dead. Prof. Porter is well known to all of the members of the State Horticultural Society. Prof. Porter came to Minnesota fifteen years ago from the East as director of the State Agricultural College of Minnesota and was engaged in this state for something like ten years. He was a

man universally esteemed by every one that knew him. He was one of the most thorough scholars in agriculture and horticulture we ever had in this state. He took the old state agricultural farm, which was located near the present state university, managed to have it turned into city lots and sold out and received funds enough to purchase the present grand plant, known as the present state agricultural farm, and made improvements that are an honor to this state and would be an honor to any state. A few years ago he removed to Missouri and was placed in the highest position the state could give him in the agricultural college. Prof. Porter was a member of our horticultural society, an active member, a useful member, always ready to encourage us in our work to do anything in our power. At a suitable time resolutions will be drafted to appear in our publications. His death is a loss to Missouri, it is a loss to horticulture in the West, and it is a loss to the world, and in recalling the many happy meetings we have had together I feel that his work among us was a wonderful encour agement to the State Horticultural Society.

Pres. Underwood: This is sad news that comes to us of the death of Prof. Porter, and will be treated as it deserves by the obituary committee.

The next number on the program was a paper on "Fruit Trees," by Nels Anderson, Lake City. (See index.)

The matter concerning the revised constitution and by-laws was then taken up, and on motion of Mr. Wedge it was decided to adopt the revised constitution and by-laws section by section. Mr. Wedge then read the entire constitution as it had been revised by the committee, after which it was again read and adopted section by section, and then on motion the constitution as submitted was adopted as a whole by the necessary two-thirds majority. (See page 6.)

A resolution was then introduced providing for a change in the articles of incorporation to conform to the new constitution, which was adopted by a two-thirds majority vote of the society.

The society then adjourned to 8:00 in the evening.

WEDNESDAY EVENING.

The evening program was opened with an instrumental duet on the piano by Mesdames Chase and Cook, which was greeted with much applause by the audience.

The following paper was then presented:

"Small Fruit from a Commercial Standpoint." L. G. Kellogg, President Wisconsin State Horticultural Society, Ripon, Wisconsin. (See index.)

Pres. Underwood: You have listened to the reading of this paper; have you any questions to ask?

Sec'y Latham: I would like to say it would be a pleasure to us if President Kellogg would send us an outline of their plan for a fruit growers' association for publication in our magazine.

Mr. L. R. Moyer, of Montevideo, read the following report of the committee on out-door herbaceous plants. (See index.)

Miss Sarah J. Buttermore, of Lake City, then read a paper on the subject of "A Farmer's Flower Garden." (See index)

Mr. Jewell, of Lake City, next sang a baritone solo, which was vigorously applauded by the audience.

"Our Wild Flowers," by Miss Sara M. Manning, of Lake City, was a subject that held the close attention of the audience and was highly appreciated. (See index.)

Mrs. I. S. Richardson, of Lake City, favored the assembly with a song which was beautifully rendered.

Mr. J. P. Andrews, of Faribault, submitted the report of the committee on deciduous trees and shrubs, including roses. (See index.)

Pres. Underwood: I think we will pass the rest of these reports for this evening, and I will now ask you to give your attention to the next subject on our program:

"How to Adorn Home Grounds." F. H. Nutter, Landscape Architect, Minneapolis. (See index.)

THURSDAY MORNING.

Pres. Underwood: The first paper this morning is the report of the committee on grapes.

Mr. C. W. Sampson then read the following report of the committee on grapes. (See index.)

Then followed "Vine Growing for Profit," by H. L. Crane, Excelsior. (See index.)

Mr. Wm. Danforth, then presented the following report of the committee on small fruits. (See index.)

Mrs. A. A. Kennedy then further continued the report of the committee on small fruits. (See index.)

"Berries for the Northwest," was then read by C. E. Tobey, Sparta, Wis. (See index.)

The next number on the program was a report on evergreens, by Mr. E. H. S. Dartt, of Owatonna. (See index.)

President Underwood: I take pleasure in introducing Mr. A. J. Phillips, Secretary of the Wisconsin State Horticultural society.

Mr. A. J. Philips (Wisconsin): Mr. President, Ladies and Gentlemen: When I came here yesterday I did not occupy any time, for the reason that I did not know just what our president had said when he came to the meeting. I am glad to have the chance to meet with you here at Lake City, and it brings back to my memory the time when I first became engaged in horticulture. Mr. Jewell, who founded this interest here, on the way home from Chicago remained with me two nights, and it was largely owing to the enthusiasm he had for growing fruits in the Northwest that I engaged in it. I bought my first hundred Wealthy apple trees of him, and when he sent them to me he also sent me a few Scotch pines, and two of them are probably as high a monument to Mr. Jewell's memory as any that could be reared, as they are on top of a bluff 250 feet high. That fact has always carried me back to pleasant recollections of horticulture.

I want to say a word in regard to our Wisconsin society. This has been one of the saddest years our state society has ever experienced. Our president, who was our president for fifteen years, and who has often met with you, was an unselfish man, a grand man, but early in February we received notice that J. M. Smith was dead. Shortly after the close of our institute in Menominee, Mr. Cook, who was to have a paper on planting this year, one of the most enthusiastic members of our society, was thrown from his buggy two weeks ago and died in a few days. In the summer, about the month of July, we lost another good man, Mr. Peffer. His death was not only a loss to Wisconsin, it was a loss to Minnesota, it was a loss to our Northwestern states, it was a national loss. Mr. Peffer was a man whose counsels we were glad to hear and to respect. Mr. Saunders told me that that old Dutchman knew more than any man ever read. I have often wondered when I have heard him, and I have often wondered when I have been at his house, who we had in Wisconsin that could take his place. Late in the fall, in November, we lost another good man: Mr. Wilcox, of La Crosse. If there was ever an honest nurseryman in the East or the West, it was Mr. Wilcox; and when you pass through Trempeleau, although you may not see any tombstone rear its proud shaft heavenward, you may see evergreens growing which he gave to the people, and which are a grander memorial to him than any monument we could erect.

We are going to have a meeting commencing on the 5th of Feb'y, and we invite you all to come down. We will try to take care of you and make it interesting for you, and in behalf of our society and of our president, who is here, I want to thank you as a society, and to thank the citizens of Lake City for the way we have been used since we have been here. We want a delegate from your society, and I am anxious to know who he is before we go away. We want to get some one, if we have to pay his board and take care of him. We want to

pump him and find out what he knows. And now, ladies and gentlemen, I thank you for the attention and kindness you have shown us while here in behalf of our society.

Pres. Underwood: It certainly has afforded us a great deal of pleasure to have had the president and secretary of the Wisconsin society with us at this meeting, and I like their informal way of coming in and helping us out, and I can assure the members of our society that if any of you should have the opportunity of going to Madison to attend their meeting, which is to be held in the capitol building, I am sure that you will find it a profitable occasion, and one you should all avail yourselves of if it is in your power to do so.

Mr. Edward A. Beal, superintendent Weather Bureau, Minneapolis, then presented a paper on the "Studies of Rainfall in Minnesota in Connection with Irrigation." (See index.

The next subject presented was, "Possibilities of Irrigation in Minnesota." D. R. McGinnis, Secretary St. Paul Commercial Club. (See index.)

The next topic was a paper read by Mr. A. H. Brackett, of Minneapolis, on "Irrigating Small Fruits with Windmill and Tank." (See index.)

Pres. Underwood: Our next paper is by Mr. E. E. Walcott, of Sparta, Wis., on his experience in "Irrigating Small Fruits with an Artesian Well." (See index,)

This was followed by "Sub-Irrigation," a paper prepared by F. H. Nutter, Minneapolis. (See index.)

At this point Mrs. Cook, of Lake City, entertained the audience with an instrumental selection on the piano.

The next subject presented was "Pump Irrigation in Minnesota." Prof. W. M. Hays, State Experiment Station. (See index.)

THURSDAY AFTERNOON.

J. R. Cummins, of Washburn, submitted the following report of the committee on vegetables: (See index).

Wm. Lyons, Minneapolis, a member of the same committee, then read the following report: (See index).

The next topic on the program was a paper on "Sweet Potato Culture in Minnesota," by J. R. Cummins, Washburn, (See index).

Mr. Wm. Somerville, Viola, submitted his paper for publication, viz. "A Farmer's Garden:" (See index).

On motion of Mr. Wedge the society then proceeded to the annual election of officers, with the following result:

President—J. M. Underwood, Lake City.

Vice-Pres.,	1st	Cong. Dis.	E. H. S. Dartt, Owatonna.
"	2d	"	S. D. Richardson, Winnebago City.
"	3d	"	Mrs. A. A. Kennedy, Hutchinson.
"	4th	"	R. S. Mackintosh, St. Anthony Park.
"	5th	"	J. H. Stevens, Minneapolis.
"	6th	"	Mrs. Jennie Stager, Sauk Rapids.
"	7th	"	J. O. Barrett, Brown's Valley.

Treasurer—Ditus Day, Farmington.

EXECUTIVE COMMITTEE.

Wyman Elliot, Minneapolis.....3 years.
J. S. Harris, La Crescent.....3 years.
S. B. Green, St. Anthony Park.....2 years.
Clarence Wedge, Albert Lea.....2 years.
J. P Andrews, Faribault.....1 year.
L. R. Moyer, Montevideo.....1 year.

Judge Moyer being called on for a few remarks anent his election as a member of the executive committee responded as follows:

Mr. President and Members of the Society: I am glad the western part of the state is represented on the executive committee, but I have too many duties to perform to make my services very valuable; however, I will do what I can. (Applause).

The next paper was read by Mr. Geo. Stout, of Lake City, on the subject of "A Few Thoughts and Ideas on Gardening." (See index).

Pres. Underwood: This finishes our program for this afternoon. The subject for this evening's meeting is "Forestry." We will now adjourn until half past seven this evening.

THURSDAY EVENING.

Pres. Underwood: There is one subject I was requested to call up that was omitted this afternoon. Mr. A. D. Leach of Lake Minnetonka will talk to us on the subject of "Cranberry Culture." (See index).

At this juncture Mr. W. F. Gardner, of Lake City, enlivened the occasion with a finely rendered cornet solo.

Pres. Underwood: We will now take up the subject of forestry. The first topic on the program which we will present is a paper on "Forestry and Evergreens," by Wm. Somerville.

Mr. Somerville: This is a subject I would like to talk on awhile, but I do not feel as if I could stand up to make any long talk. I have a paper on that subject which I have handed to the secretary, Mr. Latham; that will tell about the story I would tell if I were to talk to you on the subject this evening. (See index).

"Forest Fires," by H. B. Ayres, was next presented.

"Working Plans of Forestry," was then read by O. F. Brand, Faribault.

(I failed to secure these two papers for publication.—Sec'y.)

Mr. Jewell next entertained the audience with a vocal solo.

J. O. Barrett, Brown's Valley, secretary of the Forestry Association, then submitted his annual report. (See index.)

Secretary A. J. Philips then talked for half an hour in a very entertaining way about Mount Vernon, the home of Washington.

Pres. Underwood: As the hour is getting late, we will not continue our program any longer. I want to say on the subject of forestry in schools that I am certain that I can remember some lessons I received in regard to the condition and growth of birches at least, and I supposed it had been kept up and was one of the features of education. But what I want to say is, that among other interesting things in schools is music, and we all would like to know something about music. Prof. Pendergast is quite as well posted in musical matters as he is in regard to education of the young, and I want him to tell you how Rubenstein played the piano, before we go home.

Prof. Pendergast then evoked the mirth and applause of the audience by rendering the selection, "How Ruby Played."

FRIDAY MORNING.

The secretary presented the following recommendation from the committee on life membership:

"The committee on life membership recommends the name of Edson Gaylord, of Nora Springs, Iowa, as an honorary life member of this society, on account of his life-long service for the Northwest in the cause of horticulture."

On motion of Mr. Wedge the recommendation of the committee was adopted.

At this point E. H. S. Dartt was called to take the chair.

Secretary Latham introduced the following resolution:

"Resolved, That the executive committee be instructed to secure the passage of a special act of the legislature incor-

porating the society according to the provisions of the present constitution."

On motion of Mr. F. G. Gould the resolution was adopted.

Chairman Dartt: We will now have the report of the committee on fruit list.

Mr. Wedge: *Mr. President, Ladies and Gentlemen:* Your committee on fruit list have prepared a report. Perhaps it would be well for me to explain a matter or two in regard to this report. In the first place the committee decided to recommend nothing that has not been tested enough to recommend it for general planting or for trial, and to recommend nothing that was not procurable in the nurseries of our own state. This is something of a departure from the usual custom.

Following is the fruit list recommended by the committe, which, after being amended and thoroughly discussed by the society, was, on motion of Mr. A. H. Brackett, adopted: (See page 10).

Chairman Dartt introduced to the society Mr. George J. Kellogg, of Wisconsin, who made a few remarks as follows:

Mr. Kellogg: Mr. President, I presume some of you have seen me before. I am sorry I could not have been here in the first part of the convention, although you may think this afternoon will be the best part. I am pleased to meet with you, and pleased to learn what I can.

Wyman Elliot, chairman of the executive committee, then submitted the following report of the executive committee to the society: (See index).

Prof. Harry Snyder, of the State Experiment Station, read a paper on the following subject:

"Domestic and Commercial Fertilizers, their Comparative Value to Horticulture." (See index).

Prof. Pendergast: Mr. President, I would like to introduce the following resolution, from the fact that it is demanded, because the appropriation that we get from the state has to be used for a certain purpose. We have found it of great value, but we could make it of still greater value if it were used where it would do the most good:

"Resolved, That the executive committee be instructed to secure, if possible, the passage of an act turning over to this society as a printing and library fund such a sum as has heretofore been provided for printing our annual report." This would give the society the privilege of using the money where it would do the most good.

On motion the resolution was adopted.

Following is the report of committee on president's address:

Your committee favors all the recommendations of the President's address.

Until the finances of the state at large have improved, it is not thought best to set aside more than $50 a year toward building a Horticultural Hall, or "home" for the society.

LYCURGUS R. MOYER,
WM. DANFORTH,
R. S. MACKINTOSH,
Committee.

Mr. Wyman Elliot: I have a resolution I wish to offer:

"Resolved, That it is the sense of this society that, when possible, a lecturer on horticulture shall be a member of the institute corps at all institutes held in this state." (For discussion relating to Farmers' Institutes, see index).

On motion of Mr. M. Pearce the resolution was adopted.

Mr. Wm. Somerville then offered the following resolution:

"Resolved, That it is the wish of the State Horticultural Society that the present legislature look with special favor upon an appropriation that may be asked for the purpose of making more efficient the school of agriculture in the state of Minnesota."

On motion of Mr. C. Wedge the resolution was adopted.

Mr. J. S. Harris, chairman of the committee on legislation, presented the following report: (See index).

On motion of Mr. Brackett the report was referred to the executive committee.

This closed the session of Friday morning, and the society adjourned to the Masonic hall to attend the banquet.

THE BANQUET.

On Friday afternoon, the last day of the session, the ladies of Lake City tendered the members of the society a banquet. While without the storm was raging, with the temperature 20° below zero, within the banquet hall was warmth and comfort, with beautiful flowers to tempt the eye, the sweet strains from the orchestra entrancing the ear, and the tables heaped with choice viands to tickle the palate of the most fastidious epicure. Covers were laid for one hundred and fifty guests, and the seats were all taken. After doing ample justice to the bountiful collation provided, President Underwood took his place as toastmaster and announced the following toasts, to which various members of the horticultural society and citizens of Lake City responded.

(1). "Fraternal relations stimulate our interests, and are a guaranty of success."

This toast was responded to by Secretary A. W. Latham.

(2). "Forestry lends its sheltering arms and makes horticulture more successful." Hon. J. O. Barrett, Brown's Valley.

(3). "Education in horticulture." Prof. S. B. Green, St. Anthony Park.

Song—"Swim Out O'Grady." A. G. Long, Excelsior.

(4). "Our reports taken in homeopathic doses once a month regulate the system and create a healthy circulation." Hon. Wyman Elliot, Minneapolis.

(5). "The true horticulturist." Rev. E. B. Chase, Lake City.

(6). "Fools for luck." E. H. S. Dartt, Owatonna.

(7). Vocal solo—"The Songs the Children Sing." Mrs. I. S. Richardson, Lake City.

(8). "The agricultural press and its relation to horticulture." Mr. P. V. Collins, Minneapolis.

(9). "Is woman as well adapted to agriculture as horticulture?" Mrs. A. A. Kennedy, Hutchinson.

(10). "The relation of the dairy to horticulture. Nothing is so good company for fruit as cream." Prof. O. C. Gregg, Minneapolis.

(11). "Pioneers in horticulture, acclimated and hardy, they are affected neither by the drouth of summer nor the cold of winter, but grandly typify the success we are to attain in horticulture." J. S. Harris, La Crescent. Mr. Harris introduced as a substitute to respond to this toast Mrs. Jennie Stager, of Sauk Rapids, who recited the poem entitled "Johnny Appleseed."

(12). "Relation of horticulture to social life." Rev. John Watson, Lake City.

(13). "Badgers and gophers fraternize. "Pres. Geo. J. Kellogg, Janesville, Wis.

(14). "As the twig is bent the tree's inclined." Prof. W. W. Pendergast, Hutchinson.

(15). "Our guest." Hon. R. H. Moore, Lake City.

(16). "Our hosts." Dr. M. M. Frisselle, Excelsior.

After the close of the banquet, and before final adjournment, the following business was transacted:

Mr. J. O. Barrett, chairman of the committee on final resolution submitted the following report:

FINAL RESOLUTIONS.

WHEREAS, It has already gone into the history of Minnesota, that the State Horticultural Society with the State Forestry Association in joint session, held its series of instructive meetings on the 8th to the 11th, inclusive, of January, 1895, in Lake City, that is so beautifully environed by the river lake and the forest studded bluffs, made doubly charming for its rural ornamentation, a city justly credited for its superior educational facilities and for a nobility of social character not excelled in the West; therefore,

Resolved, That we hereby tender our sincere thanks to the generous citizens of Lake City, who have so kindly and pleasantly entertained us in their genial homes, and that we largely owe the success of this annual meeting to the competent manner our president and his city helpers have provided for our needs and enjoyment with them during of the best session we have ever held in the state.

Resolved, That the question, who shall take our places when our hands can no longer plant, is amply answered in the State Agricultural School at St. Anthony Park, assured as we are that when the veterans have gone to the fruit lands of heaven, the students there educated will be qualified to profit even by our mistakes, and will advance the cause we have loved so well to higher and grander results.

Resolved, That the matter of irrigation, as outlined at the sessions of our society, deserves the special attention of our legislature to advance its special interests.

Resolved, That the hour has come when our legislature must provide ways and means by which forest fires shall be prevented, that woodland property and life shall be more secure in the state, and that such timely provision is the best possible safeguard to our horticultural successes.

Resolved, That we recommend the establishment of village improvement societies, as organized by Prof. B. G. Northrop of Connecticut, and that too in every part of our state, so that our towns and cities may be made more beautiful and more healthful for such ornamentation, and more conducive to refinement of character and patriotic love of country.

On motion of Mr. Dartt the resolutions were adopted by a rising vote.

Pres. Underwood: I wish I could express to you the pleasure I have felt in having you all here at this time. I want to express my gratitude to the friends of Lake City who have so nobly and ably seconded ever effort on my part to bring about this meeting, and to them in a great measure is due its success. I assure you nothing in my experience in all my life has ever touched me so much, where I have been taught to feel what it is to have friends, as the occasion of this meeting of the horticultural society, and I shall always feel as though I should lack

words to express my gratitude for that friendship. I wish I might tell each one of them how much I value their friendly advice and assistance.

And now, as I do not think there is anything else to come before the society, we will bring our meeting to a close by singing you a song entitled "Uncle Joe."

Pres. Underwood sang this song in his hearty way, and the annual meeting was then declared adjourned.

AWARD OF PREMIUMS.

At the Winter Meeting of 1895 of the Minnesota State Horticultural Society.

APPLES.

Articles.	Exhibitor.	Premium.	Amount.
Collection	J. S. Harris	First	$5.00
Seedling	"	Second	2.00
Wealthy	"	First	1.00
Walbridge	"	First	1.00
Plumb Cider	"	First	1.00
Malinda	A. K. Bush	First	1.00
Seedling	B. Taylor	First	3.00
Meaders Winter	"	First	1.00
Longfield	Clarence Wedge	First	1.00
Hibernal	"	First	1.00
Lieby	"	First	1.00
Wealthy	"	Second	.50
Antonovka	"	First	1.00
Elgin Beauty	"	First	1.00
Oldenberg	"	First	1.00
Maiden Blush	"	First	1.00
Collection	"	Second	3 00
Malinda	Ditus Day	Second	.50
Haas	"	First	1.00
Meaders Winter	"	Second	.50
Clara	"	First	1.00
Chases Winter	"	First	1.00
Minnesota	"	First	1.00

JNO. P. ANDREWS, Committee.

GRAPES.

Collection	H. L. Crane.	First	5.00
Delaware	"	First	1.00
Duchess	"	Second	.50
Brighton	"	First	1.00
Rogers No. 15	"	First	1.00
Lindley	"	First	1 00
Eumelan	"	First	1.00
Pocklington	"	Second	.50
Iona	"	First	1.00
Concord	"	First	1.00
Agawam	J. R. Cummins	Second	.50

A. H. BRACKETT, Committee.

FLOWERS.

Articles.	Exhibitor.	Premium.	Amount.
Collection of Ornamental and Flowering Plants	Jewell Nursery Co	First	5.00
Single Geranium	"	First	1.00
Table Bouquet	"	Second	1.00
Collection Cut Carnations	"	First	2.00
Floral Design	"	First	5.00
Basket of Flowers	"	Second	1.00
Collection of Roses	"	Second	1.00
Collection of Roses	E. Nagel	First	2.00
Table Bouquet	"	First	2.00
Basket of Flowers	"	First	2.00
Single Begonia	Jewell Nursery Co	First	1 00
Collection of Carnations	F. G. Gould	Second	1.00

MATTIE S. CHASE,
MARY E. PATTON,
JENNIE STAGER,
Committee.

VEGETABLES.

Collection	Nils Anderson	Second	3.00
Beets	Wm. H. Longsdorf	First	1.00
Early Potatoes	H. F. Bussee	First	1.00
Late Potatoes	"	First	1.00
Onions	"	First	1.00
Turnips	"	Second	.50
Parsnips	"	First	1.00
Carrots	"	Second	.50
Celery	"	Second	.50
Cabbage	"	First	1.00
Carrots	J. R. Cummins	First	1.00
Radishes	"	Second	.50
Lima Beans	"	Second	.50
Sweet Potatoes	"	First	1.00

M. M. FRISSELLE, Committee.

HONEY.

Comb	C. Theilmann	First	5.00
Extracted	"	First	3.00
Comb	John Turnbull	Second	3.00

WM. DANFORTH, Committee.

PANTRY STORES.

Collection	Nils Anderson	First	2.00

JENNIE STAGER, Committee.

RECORD OF EXECUTIVE BOARD MEETINGS FOR 1895.

Meeting held at the residence of J. M. Underwood, Lake City, 7 p. m., Jan. 7.

Messrs. Harris, Andrews, Underwood, Wedge, Day and Latham were in attendance. In the absence of the chairman, Mr. Wyman Elliot, Mr. Underwood was elected chairman pro tem.

The following bills were audited:

R. C. Keel, expenses as delegate to Wisconsin.....$12.40
A. Terry, " " " " South Dakota..... 12.00
E. A. Cuzner, salary as assistant librarian for 1894..... 10.00

J. M. Underwood being called away, J. S. Harris was elected chairman pro tem.

The secretary's accounts for the year were examined and found correct, and his bill for the expenses of the secretary's office, etc., audited and allowed, namely,

A. W. Latham.....$231.25

The books of the treasurer, Ditus Day, were examined and found correct for 1894, and it it so recorded therein.

Adjourned sine die,

A. W. LATHAM, Sec.

Meeting held at the Masonic Hall, Lake City, at 5 p. m., Jan. 11.

All the members of the board were in attendance. It being the first meeting of the board following the annual election, Mr. Wyman Elliot was elected chairman of the board for the ensuing year.

The following bills were audited and allowed:

Mrs. Jennie Stager, expenses as vice-president,.....$ 5.40
L. E. Day, " " " " 2.22
R. S. Mackintosh, " " " " 2.30
Wm. Somerville, expenses as delegate to Iowa..... 16.50
Ditus Day, " " treasurer for 1894..... 7.09
Clarence Wedge, expenses as delegate to Northern Iowa, and executive committee 19.90
J. S. Harris, expenses on executive committee..... 3.15
J. P. Andrews, " " " " 5.00

A. W. Latham was elected secretary for 1895, at a salary of $600.00. E. A. Cuzner was elected assistant librarian.

It was decided to discontinue the experiment station at St. Cloud, Mr. D. E. Myers having removed from there. Messrs. Elliot, Green and Latham were appointed a committee to revise the list of experiment stations and also to prepare the list of annual committees for the year.

The treasurer's bond for 1895 was fixed at $1,000.

A committee appointed by the society on the nursery fraud law reported, and the report was referred to President Underwood for endorsement and transfer to the legislative committee for action. The committee on legislation was authorized to proceed to secure the enactment of any legislation they deemed necessary to the interests of the society.

Adjourned sine die,

A. W. LATHAM, Sec.

Meeting held at secretary's office, Minneapolis, at 2 p. m., June 19.

All the members were in attendance with the exception of Clarence Wedge.

Upon motion it was decided that the secretary should enter into an arrangement with Minnesota nurserymen to allow them a discount of fifty per cent. on annual memberships offered by them as premiums in connection with the sale of nursery stock.

The accounts of the secretary's office from Jan. 11, 1895 to June 19, 1895, were examined and found correct, and his bill covering that period, amounting to $383.17, was ordered paid.

The secretary was instructed to procure some glazed doors for the library shelves and purchase a typewriter for use in his office. It was decided to pay the express and storage charges on fruit to be sent to Minneapolis and stored there for purposes of an exhibit at the coming winter meeting.

Upon motion it was provided that hereafter the superintendents of unpaid experiment stations should have their traveling expenses paid in connection with their attendance at the annual winter meeting, provided they make at that time a detailed report of the condition of whatever horticultural stock may be growing upon their respective places. Wm. Somerville was appointed superintendent of an experiment station to be located at the place of his residence, Viola.

Adjourned to the afternoon of June 20, 1895.

A. W. LATHAM, Sec.

Meeting held at the state experiment station, St. Anthony Park, at 4:30 p. m., June 20.

All the members were in attendance except Prof. S. B. Green and Clarence Wedge.

Mr. Ditus Day tendered his resignation as treasurer, which was accepted. Mr. F. G. Gould, of Excelsior, was appointed to fill the vacancy until the next annual election. His bond was fixed at $1,000.

Adjourned to meet upon call of the chairman during the state fair, 1895.

A. W. LATHAM, Sec.

Meeting held at the agricultural building, Minnesota State Fair, Sept. 11, at 2 p. m.

All the members were present except J. M. Underwood.

The following bills were audited and allowed:

Ditus Day, expenses and salary as treasurer	$16.50
Clarence Wedge, expenses as member of ex. board and on trip through the orchards of the state	22.44
J. S. Harris, expenses as member of ex. board	10.60
L. R. Moyer, " " " " " "	12.03
J. P. Andrews, " " " " " "	5.00

The chairman of the committee, Wyman Elliot, was authorized to audit the account of Prof. Green for expenses on a trip through the orchards of the state when presented.

The question of the place of holding the next annual meeting of the society was considered, and a committee consisting of Pres. J. M. Underwood, Chairman Wyman Elliot and Sec. A. W. Latham was appointed to decide the question and, also, to prepare the usual program for the meeting.

Adjourned sine die,

A. W. LATHAM, Sec.

LIST OF MEMBERS, 1895.

Annual Members.

Akin, D. F.....Farmington
Andrews, J. P.....Faribault
Anderson, Nils.....Lake City
Armstrong, Augustus.....Albert Lea
Ayres, H. B.....Carlton
Aspinwall, N. P.....Harrison
Abbott, C. A.....Saratoga
Aschenbeck, J. H....731 4th ave. N., Minneapolis
Austin, L. E.....Glencoe
Anderson, John.....Red Wing
Anderson, T. A.....Dawson
Angus, Robert.....Garfield
Adelmann, Wm.....Richfield Center
Alston, Richard.....Winnipeg, Man.
Bofferding, Wm. H .....125 Plymouth ave., Mpls.
Buttermore, R. H.....Lake City
Buck, Willard.....Alexandria
Blair, C. L.....St. Charles
Bedford, S. A.....Brandon, Man.
Brackett, A. H.....Long Lake
Bush, A. K.....Dover
Barrett, J. O.....Browns Valley
Buttermore, R. N.....Lake City
Brown, J. W.....Red Wing
Bullis, A. H.....Winnebago City
Broberg, Theo. O.....Waconia
Blackwall, Mrs. J. W.....Fort Totten, N. D.
Broman, Aug.....Atwater
Bisbee, John.....Madelia
Bussee, H. F.....Station "A," Minneapolis
Brown, C. F.....St. Peter
Brandt, J. A.....Willow River
Burns, J. J.....Caledonia
Barnes, W. K.....Alexandria
Brand, N. F.....1121 4th st. S. E., Minneapolis
Bonniwell, Mrs. Annie.....Hutchinson
Boodleson, B. J.....Ortonville
Broughton, A. L.....2626 Polk st. Minneapolis
Beardsley, B. F....113 Endicott Arcade, St. Paul
Brown, Mrs. J. H.....Lac qui l'arle
Bunnell, M. C.....Newport
Beard, Thos.....Coalsville, Utah
Bradford, P. F.....Empire
Buck, Hon. Dan'l.....Mankato
Bonwell, Arthur.....Blue Earth City
Becker, J. C.....Adrian
Baston, J. J.....St. Louis Park
Brewer, I. C.....St. Charles
Brewster, Prof. H. W.....St. Anthony Park
Bolstad, N. A.....Dawson
Bruce, Mrs. M. M.....St. Anthony Park
Bedford, S. S.....Brandon, Man.
Blomquist, O. W.....Spencer Brook
Buckingham, W. P.....Park River, N. D.
Bailey, N. G.....Delavan
Brennan, E. J.....527 Carroll st., St. Paul
Bost, A. A.....Excelsior
Brunson, W. A.....Brownsville
Barton, Mrs. I.....Excelsior
Brynildsen, Jac.....Graceville
Busch, Fred.....Richfield
Corlett, J. E.....Farmersburg, Ia.
Conyne, N.....(Box 53), Pelican Rapids
Cowles, F. J.....West Concord
Chase, Rev. E. B.....Lake City
Cook, M. W.....Rochester
Crandall, W. W.....Sumter
Carroll, R. C.....St. Anthony Park
Cross, Mrs. E.....Sauk Rapids
Crandall, C. B.....Red Wing
Crane, H. L.....Excelsior
Clark, Chas. B.....505 15th ave. N., Minneapolis
Cummins, Osburn.....Washburn
Church, J. G.....Lake City
Crawford, M.....Cuyahoga Falls, O.
Conver, C. W.....Sac City, Ia.
Cuzner, E. A.....Essex and 27th ave. S. E., Mpls.
Cuzner, Mrs. E. A. Essex and 27th ave. S. E., Mpls.
Corbett, Prof. L. C.....Brookings, S. D
Clow, H. S.....Dakota
Cash, W. H. H.....New Lisbon, Wis.
Crandall, E. J.....Deerfield
Cook, Dewain.....Windom
Cutts, E. J.....Howard Lake
Comee, S. S.....Waseca
Covell, M. F..518 Humboldt ave. N., Minneapolis
Chandler, E. M. ..28 Wash. ave. N., Minneapolis
Cary, Mrs. Anne A.....Mandan, N. D.
Colburn, N. I., 3022 Longfellow ave., Minneapolis
Carlson, E. W.....St. Cloud
Coffin, E. A.....1810 E. 5th st. Duluth
Code, Wm.....Park River, N. D.
Crooker, Mrs. E. B.....Eureka
Caulter, Jos.....Park River, N. D.
Catterton, D. F.....Piedmont, S. D.
Carr, W. A.....Excelsior
Chambers, Willis.....Pratt
Crickmore, Robt.....Owatonna
Crosby, F. M.....Hastings
Colgrove, J.....Clearwater
Clapp, H. A.....Rochester
Cutting, A. L.....Byron
Cass, Geo. J.....Portland
Dedon, W. S.....Taylors Falls
Danforth, Wm.....Red Wing
Decker, H. C.....Dresbach
Dickson, Mrs. P. R.....Dresbach
Day, L. E.....Farmington
Doughty, J. Cole.....Lake City
Doughty, T. H.....Lake City
Day, Ditus.....Farmington
Dawson, W. H.....Slayton
Doudna, J. M.....Alexandria
Dampier, Wm.....20 W. 3d st., St. Paul
Durkee, M. P.....Hancock
Donaldson, R. A.....Grand Meadow
Dawson, Chas.....400 Sibley st., St. Paul
Dowd, Michael.....New Canada
DeCon, Franklin.....E. 7th st., St. Paul
Dickerson, F. J.....Medford, N. D.
Doolittle, C. J.....Evansville, Wis.
Derby, E. D.....Winnebago City
Dackson, Geo.....Litchfield
Ellergodt, H. O.....Lanesboro
Eklof, John.....Cokato
Ensberg, S.....Toronto, S. D.
Engberg, Rev. O.....Cambridge
Flatin, G. F.....Spring Grove
Fuller, G. W.....Lake City
Frisselle, Dr. M. M.....Eureka
Frederickson, Lars.....New Ulm
Frankland, Thos.....Stonewall, Man.
Fleming, Albert.....Garden City
Furber, J. T.....Madelia
Frenn, P. J.....Red Wing
Francis, Mrs. Alfred.....St. Cloud
Fryer, W. E.....Genoa
Flaten, A. A.....Edinburg, N. D.
Frost, B. F.....Parkers Lake
Fairchild, H. S.....Bd. of Pub. Works, St. Paul
French, W. S.....Slayton
Gerrish, Allen.....St. Charles
Gould, Chas.....Lake City
Green, Prof. S. B.....St. Anthony Park
Gamble, Ed.....Rowland
Gabion, J. D.....Brainerd
Gearty, T. G.....Robbinsdale
Gwinn, J. A.....Byron
Gmeiner, Rev. John,
House of the Good Shepherd, St. Paul
Gerdsen, Henry.....Victoria
Gustafsen, Chas.....Little Falls
Goodman, D. E.....Faribault
Glasoe, N. E.....Spring Grove
Gergen, N. B.....Hastings
Greenlee, John.....Chatfield

Giles, G. W.....Zumbrota
Goff, Prof. E. S.....Madison, Wis.
Gregg, O. C.....1425 6th st. S. E., Minneapolis
Goss, H. M.....Mountain Lake
Haseltine, E. W.....Grand Forks, N. D.
Hill, C. L.....Albert Lea
Hamlin, Alonzo.....Spring Valley
Hitchcock, J. H.....Weaver
Hughes, S. M.....Lake City
Howard, J. A.....Hammond
Horrigan, John.....Lake City
Hays, Prof. W. M.....St. Anthony Park
Hartmann, A. M....201 6th st. N. E., Minneapolis
Haeg, Ed.....Bloomfield
Hagen, O. J.....Hendrum
Hacklander, A.....Blue Earth City
Hall, Prof. C. H.....Minneapolis
Heins, H. H.....Lydia
Howie, Mrs. L. E...424 S. 4th st., Atchinson, Kan.
Halland, T. S.....Rushford
Huseby, Arne A.....Adams
Hawkins, J. C.....Austin
Holliday, W. A.....Winton Pl..Cincinnati, O.
Halgreen, Mrs. S.....Cormorant
Haggard, H.....Excelsior
Hanson, H. J.....Dawson
Heydt, August.....Fort Benton, Mont.
Hendrickson, W. G.....Hamline
Halderson, M.....Park River, N. D.
Holmberg, F. R.....West Duluth
Hunter, John.....Anoka
Jaques, E. K.....Crystal
Johnson, Gus.....2020 22½ ave. S., Mpls.
Jacobson, J. S.....Elbow Lake
Jenson, Mrs. L. L.....Grand Rapids
Jewett, Z. K.....Sparta, Wis.
Jewett, R. H. L.....Oakland ave., St. Paul
Jennerson, N. D.....Chowen
Jentoft, O. T.....Bright, S. D.
Johnson, J. L.....Owatonna
Jensen, Neils.....Tyler
Johnson, A. A.....Winnebago City
Jackson, T. P.....Brownton
Knapheide, R.....St. Paul
King, E. C.....Ibsen
Kimball, F. W.....Austin
Kennedy, Mrs. A. A.....Hutchinson
Kennedy, J. W.....Lake City
Keel, R. C.....Rochester
Kording, John.....Blooming Prairie
Kenney, S. H.....Morristown
Kilbourne, F. M.....Lakeville
Katzner, Rev. J. B.....Collegeville
Krook, A. G.....Lindstrom
Kolasky, Geo. W.....Adrian
Klein, Jacob.....Caledonia
Kramer, J. C.....La Crescent
Knudson, H.....Springfield
Kendall, John.....St Peter
Lyman, H. M.....Excelsior
Longsdorf, W. H.....Lake City
Leach, A. D.....Excelsior
Lord, O. M.....Minnesota City
Long, A. G.....Excelsior
Lyons, Wm.....2924 Clinton ave., Minneapolis
Lowry, Thos.....Lake City
Laird, J. C.....419 E. 3rd st., Winona
Lietz, L.....Dover
Luke, F. K.....Brookings, S. D.
Larson, G.....box 591. Rochester
Lawson, Wm.....614 Westminster st., St. Paul
Lehman, Chas.....Mound Prairie
Lory, H. A.....Maple Ridge
Laythe, S. W.....Kinbrae
Lynn, Jas.....Camp Douglas, Wis.
Lyons, Mrs. Mary. A ....2924 Clinton ave., Mpls.
Lindberg, A. S.....Brainerd
Longfellow, A. R.....Monticello
Leonard, Dr. H. C.....1527 N. 6th st., Mpls.
Leonard, S. F.....Washington
Lundwall, Nelson.....Bozeman, Mont.
Lucken, K. J.....Portland, N D.
Luhmann, Geo.....Howard Lake
Loudon, John.....Excelsior
Lindesmith, O.....Owatonna

Larson, John A.....Belvidere Mills
Lapham, F. M.....Anoka
Metcalf, F. C.....40 5th st. S., Mpls.
Mohl, Fred.....Adrian
Murray, J. W.....Excelsior
Mackintosh, Wm.....Langdon
Mackintosh, R. S.....St. Anthony Park
Moyer, L. R.....Montevideo
Marston, Perrin.....Winnebago City
Myers, A. J.....Lake City
Manning, Soloman.....Bedford, N. H.
Middlebrook, Elmer.....Eden Prairie
Moore, R. H.....Lake City
Malcolm, H. W.....718 Hennepin ave., Mpls.
Mathieson, H.....Watertown, S. D.
May, L. L.....St. Paul
Merritt, C. W.....Homer
Mitchell, Geo.....Owatonna
Mason, J. R.....Forest Mills
Munson, Paul.....Parkers Prairie
Miner, J. E.....3022 Dupont ave. S., Minneapolis
Morisse, Geo. F.....Alexandria
Mainz, Simon.....Hastings
Monson, N. L.....Buffalo Lake
Milbradt, A. W.....Wood Lake
Marshall, Jos.....Washington
Mills, W. E. L.....Lac qui Parle
Magnusson, S.....Stark
Moot, A. T.....Harriet
Morrison, Mrs. D.....Villa Rosa. Minneapolis
Miller, Chas.....Ellsworth. Wis.
Mitchell, Dr. C. F.....Good Thunder
Moeser, Frank.....1320 Western ave., City
Miner, J. P.....Winnebago City
Manning, Martin.....Greenleaf
Mills, Mrs. J. S.....Elk River
Mack, Miss Beatrice L.....Marshall
Mills, L. D.....Garden City
Milgaard, O. L.....Argyle
McKinstry, L. H.....618 E. 15th st., Mpls.
McGinnis, D. R.....St. Paul
McPherson, Mrs. G. K.....28 12th st. N., Mpls.
McCool, John.....Barry
McKinstry, A. W.....Faribault
McClintock, Mrs. J. B.....Lakefield
McHugh, Jas.....Clay Bank
McPhail, Alex.....St. Thomas, N. D.
McConnell, W. W. P.....Mankato
Nelson, Hans.....Fergus Falls
Nutter, F. H.....701 Sykes Block, Mpls.
Noehl, John.....Kasson
North, Eben.....Pleasant Grove
Nordquist, O. A.....33 W. Sycamore st., St. Paul
Norswing, K. B.....Holden
Otterness, E. L.....Wastedo
Oxford, Wm.....Freeburg
Olsen, Nels M.....Forest Mills
Oved, P. J.....Alden
Opjorden, O. K.....Milan
Orcutt, Wm.....Sauk Rapids
Ostergren, E. A.....Box 466, St. Paul
Peterson, L. P.....Freeborn
Parks, Jas.....Barnum
Penning, Martin.....Sleepy Eye
Pederson, H. J.....Tyler
Peters, W. G.....St. Vincent
Pell, W. A.....Northfield
Prescott, G. H.....Albert Lea
Perry, G. S.....Farmington
Putnam, W. H.....River Falls, Wis.
Pendergast, W. W.....Hutchinson
Powell, F. M.....Glenwood, Ia.
Pond, E. R.....Bloomington
Patterson, Jas.....Gen'l. Delivery, City
Payne, S. D.....Kasota
Prichett, John.....Alexandria
Parker, G. W.....Lenora
Pond, H. H.....Bloomington
Parker, W. L.....Farmington
Pope, Jed.....Caledonia
Powell, F N.....Glenwood, Ia.
Parkhill, R.....Chatfield
Pennell, Prof. C. S.....St. Anthony Park
Parks, J. S.....Pleasant Mounds
Pierce, H. M.....Minnesota City

Persons, C. O.....Lester
Redpath, Thos.....Long Lake
Roberts, C. L.....Lake City
Richardson, S. D.....Winnebago City
Richardson, W. F.....Winnebago City
Reichard, G. A.....408 6th ave. S., Minneapolis
Richardson, Isaac.....Lake City
Reeve, Mrs. H. R.....Lake City
Rue, H. N.....Big Stone City, S. D.
Reed, F. H.....Racine
Randall, Wm.....Mapleton
Robbins, D. H.....Vineland
Richards, S. E.....Park River, N. D.
Robinson, M.....640 E. 19th st., City
Reinestson, Christ.....Praha, N. D.
Robinson, C. E.....Wadena
Smith, S. B.....Keevilie
Solly, John.....Pelican Lake
Sexton, C. H.....9 Wash. N., Minneapolis
Solem, Rev. O. A. Th.....Halstad
Sandrock, Wm.....Money Creek
Sundberg, C. A.....Worthington
Stout, Geo. C.....Lake City
Sampson, C. W.....Eureka
Scofield, L. H.....Bloomington
Snyder, Prof. Harry.....St. Anthony Park
Snyder, Mrs. Harry.....St Anthony Park
Secor, David.....Winnebago City
Scott, W. G.....Winnipeg, Man.
Schultz, L.....Sutton
Stranwold, Ole.....Trysil, N. D.
Stevenson, A. P.....Nelson, Manitoba
Sharp, J.....Slayton
Studley, H. H.....3131 Hennepin ave., Mpls.
Scarff, W. N.....New Carlisle, O.
Seiler, J. M.....Chanhassan
Schain, J. T.....Browns Valley
Smith, D. F.....St. Charles
Sargent, C. A.....Red Wing
Sprague, A. D.....Caledonia
Smith, C. H.....Excelsior
Shaver, J. G.....Center Chain
Spicer, J. M.....Willmar
Simpson, Arthur.....Slayton
Simonds, A. G.....803 Guaranty Loan, Minneapolis
Seymour, Asa N.....Mazomanie, Wis.
Smith, Caleb.....Farmington
Shogren, E.....Red Wing
Shearman, Wm. O.....Howard Lake
Sullivan, M., M. D.....Adrian
Shelby, Chas. H.....Butternut
Sartell, Mrs. Joseph.....St. Cloud
Stanley, Mrs. Emma.....Sauk Rapids
Stevens, O. J.....Tyler
Stark, Dr. T. F.....Hasty
Sprague, Mrs. L. E. P.....225 8th ave. S. E., Mpls
Smith, J. O.....Casselton, N. D.
Slette, Gilbert.....Park River, N. D.
Stroble, Christian.....Winnebago City
Smitten, G. W.....St. Cloud
Stinson, Henry.....Starbuck
Sampson, J. A.....Excelsior
Smith, Geo. H.....Long Lake
Tracy, G. A.....Watertown, S. D.
Thayer, Mrs. P. A.....Sauk Rapids
Turnbull, John.....La Crescent
Taylor, Barnett.....Forestville
Theilmann, C.....Theilmanton
Thayer, M. A.....Sparta, Wis.
Thornber, W. S.....Brookings S. D.
Thompson, O. H.....New London
Thorndike, David.....Slayton
Thompson, Thos.....Grand Forks, N. D.
Tarrant, Harry.....Janesville, Wis.
Thomas, A. A.....1209 Ashland Block, Chicago, Ill.
Tmey, B.....Hutchinson
Tingley, W. J.....Stillwater
Trenham, N. J.....Fergus Falls
Turner, John.....Shakopee
Townsend, G. W.....Baraboo, Wis.
Thorp, Freeman.....250 State st., Chicago, Ill.
Underwood, J. M.....Lake City
Underwood, Roy.....Lake City
Underwood, Mrs. Anna B.....Lake City
Van Hoesen, F. B.....Alexandria
Vandyke, W. B.....Vesta, N. D.
Warwick, Jas.....Money Creek
Wachlin, Wm.....Faribault
Willwerth, Peter.....Richfield Center
Weston, Geo. A.....Fairbault
Windmiller, Fred.....Mankato
Williams, Mrs. M. L.....Nimrod
Will, Oscar H.....Bismark, N. D.
Walker, J. C.....Rose Creek
Wolcott, E. E.....Sparta, Wis
Widmoyer, W. S.....Dresbach
Wilson, Edwin.....Lake City
Wedge, Clarence.....Albert Lea
Witte, H. L. F.....629 5th st. N., Minneapolis
West, J. P.....Hastings
Watt, John.....Leonard, N. D.
Wilcox, A. G.....148 Highland ave., Minneapolis
Willford, Wm.....Canton
Wright, Wm. J.....Coalsville, Utah
Woodman, P. M.....Lumber Exchange, Mpls
Willis, Frank D.....202 Chamber of Com., St Paul
Woehle, B.....Bloom
Wood, E. G.....Waseca
Wallner, Berthold.....411 S. Wabash, West St. Paul
Widger, Geo.....Chatfield
Ware, E.....Owatonna
Wagner, D. E.....Winthrop
Williams, Theo.....Benson, Neb.
Whitbread, Edw.....Langdon
Wittmann, Aug.....Merriam Park
Washburn, F. H.....Shiocton, Wis.
Williams, Prof. T. A.....Brookings, S. D.
Walrath, H. D.....Watertown, S. D.
Werner, John.....Fulda

Life Members.

Boxell, J. W.....85 W. Congress st., St. Paul
Cummins, J. R.....Washburn
Evans, Sheldon.....La Crescent
Gardner, Chas. F.....Osage, Ia.
Gjemse, L. J.....Hader
Harris, E. E.....La Crescent
Harris, F. I.....La Crescent
Manda, W. A.....Short Hills, N. J.
Nagel, Eggert.....1118 W. Lake st., Minneapolis
Stager, Mrs. Jennie.....Sauk kapids
Swanson, Aug. S.....St. Paul
Thompson, Mrs. Ida.....Duluth
Terry, Alfred.....Slayton
Wheaton, D. T.....Morris

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Cleveland, Prof. H. W. S.....Minneapolis
Corp, Sidney.....Hammond
Dartt, E. H. S.....Owatonna
Elliot, Wyman.....Minneapolis
Ford, L. M.....San Diego, Cal.
Gaylord, Edson.....Nora Springs, Ia.
Grimes, J. T.....3209 Nicollet ave., Minneapolis
Gideon, P. M.....Excelsior
Gibbs, Oliver, Jr.....Ramsey, S. D.
Gould, F. G.....Excelsior
Harris, J. S.....La Crescent
Lacey, Chas. Y.....Fort Benton, Mont.
Luedloff, Chas.....Carver
Latham, A. W.....Minneapolis
Manning, J. W.....Reading, Mass.
Manning, Mrs. J. W.....Reading, Mass.
Mendenhall, R. J.....Minneapolis
Manning, Miss Sara M.....Lake City
Plumb, J. C.....Milton, Wis.
Phœnix, F. K.....Delavan, Wis.
Palst, Mrs. Wm.....Hersey
Pearce, M.....Chowen
Peterson, Andrew.....Waconia
Robertson, Col. D. A.....St. Paul
Stevens, Col. J. H.....Minneapolis
Smith, Truman M.....San Diego, Cal.

Sias, A. W.....Harbor View, Fla.
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Sargeant, Mrs. H. B .....Lake City
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M. A. Thayer, elected 1891.....Sparta, Wis.
G. J. Kellogg, elected 1891.....Janesville, Wis.
J. B. Mitchell, elected 1892.....Cresco, Ia.
C. H. Hamilton, elected 1892.....Ripon, Wis.

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	Died.
P. A. Jewell, Lake City	1878
Dr. John A. Warder, South Bend, O	1883
L. B. Hodges, St. Paul	1883
D. W. Humphrey, Faribault	1885
Marshall P. Wilder, Boston, Mass	1886
Chas. Hoag, Minneapolis	1888
Mrs. Wealthy Gideon, Excelsior	1889
Chas. Gibb, Abbotsford, Quebec	1890
R. L. Cotterell, Dover Center	1891
E. Wilcox, Trempeleau, Wis	1894
Philip Herzog, Minneapolis	1894
J. M. Smith, Green Bay, Wis	1894
Geo. P. Peffer, Pewaukee, Wis	1894
D. A. Robertson, St. Paul	1895

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